AUTUMN 2007

BSCB Newsletter

BRITISH SOCIETY FOR CELL BIOLOGY

News | Features
Book Reviews | Meeting Reports
Forthcoming Meetings

British Society for Cell Biology

B S C B

The ASCB 47th Annual Meeting

December 1–5, 2007, Washington Convention Center, Washington, DC

Bruce M. Alberts, President ■ R. Dyche Mullins, Program Chair ■ John Hammer, Local Arrangements Chair

Keynote Symposium

Saturday, December 1

New Biologists for the New Biology—6:00 pm
William Bialek, Princeton University
Shirley Ann Jackson, Rensselaer Polytechnic Institute

Symposia

Sunday, December 2

Membrane Dynamics—8:00 am
Pietro De Camilli, Yale University School of Medicine/HHMI
Kit Pogliano, University of California, San Diego
Kai Simons, Max Planck Institute, Dresden

Architecture of Signaling Systems—10:30 am
Richard M. Losick, Harvard University
Tobias Meyer, Stanford University School of Medicine
Pamela A. Silver, Harvard Medical School

Monday, December 3

Cell Biology of Metazoan Development—8:00 am
Kathryn Anderson, Memorial Sloan-Kettering Cancer Center
Marie-Anne Felix, Jacques Monod Institute, CNRS
Richard Harland, University of California, Berkeley

Unconventional Organelles—10:30 am
Martina Brueckner, Yale University School of Medicine
Stephen Gould, Johns Hopkins University
Yoshinori Ohsumi, National Institute for Basic Biology

Tuesday, December 4

Geography of Signaling—8:00 am
Howard Chang, Stanford University
Deborah Hogan, Dartmouth Medical School
Elly Tanaka, Max Planck Institute, Dresden

Force and Form in Cell Biology—10:30 am
Dennis Discher, University of Pennsylvania
Michael P. Sheetz, Columbia University
Valerie M. Weaver, University of California, San Francisco

Wednesday, December 5

Single Molecule Studies—8:00 am
Steve Kowalczykowski, University of California, Davis
Paul Selvin, University of Illinois
Michelle Wang, Cornell University

Cell Biology in Ten Years—10:30 am
Benjamin F. Cravatt, III, The Scripps Research Institute
David Haussler, University of California, Santa Cruz
Stanislas Leibler, Rockefeller University

For more information, contact the ASCB: (301) 347-9300 www.ascb.org/meetings

Minisymposia

Apoptosis and Organelles
Seamus J. Martin, University of Dublin, Trinity College
Donald Newmeyer, La Jolla Institute for Allergy and Immunology

Assembling Complex Cytoskeletal Structures
Jacek Gaertig, University of Georgia
Dave Kovar, The University of Chicago

Biological Oscillators
Jay C. Dunlap, Dartmouth Medical School
Hideo Iwasaki, Nagoya University

Cell Biology and Disease
Lucy A. Godley, The University of Chicago
Timothy J. Mitchison, Harvard Medical School

Cell Biology of the Synapse
Edwin R. Chapman, University of Wisconsin–Madison
Graeme W. Davis, University of California, San Francisco

Cell Cycle
Michael Glotzer, The University of Chicago
Sue L. Jaspersen, Stowers Institute for Medical Research

Cell Migration/Motility
Jeff Hardin, University of Wisconsin–Madison
Irina Kaverina, Vanderbilt University Medical Center

Chromatin Architecture and Remodeling
Laura Rusche, Duke University Medical Center
Jerry Workman, Stowers Institute for Medical Research

Cytoskeletal Dynamics and Polarity
Ed Munro, Center for Cell Dynamics, University of Washington
William Saxton, University of California, Santa Cruz

Epithelial Morphogenesis
M. Thomas Lecuit, Developmental Biology Institute of Marseilles-Luminy
Jennifer Zallen, Memorial Sloan-Kettering Cancer Center

Evolution of Eukaryotic Endomembrane Systems
John A. Fuerst, University of Queensland
Trevor Lithgow, University of Melbourne

Extracellular Matrix as a Memory Storage Device
Linda Gay Griffith, Massachusetts Institute of Technology
Patricia Keely, University of Wisconsin–Madison

High-Tech Cell Biology
Grant Jensen, California Institute of Technology
Kendall Knight, University of Massachusetts Medical School

Host–Pathogens Interactions and Innate Immunity
Joanne Engel, University of California, San Francisco
Jean Greenberg, The University of Chicago

Intermediate Filaments and Nuclear Lamins
Pamela K. Geyer, University of Iowa
Birgit Lane, IMB Singapore and University of Dundee

Making 'omics Useful to Cell Biologists
John D. Aitchison, Institute for Systems Biology
Nevan J. Krogan, University of California, San Francisco

Mechanics of Cytoskeletal Systems
Margaret L. Gardel, The University of Chicago
Wolfgang Losert, University of Maryland, College Park

Mechanics of Epigenetic Regulation
Gary Felsenfeld, National Institute of Diabetes & Digestive & Kidney Diseases/NIH
Cynthia Wolberger, Johns Hopkins School of Medicine/HHMI

Mechanisms of Membrane Trafficking
Juan Bonifacino, National Institute of Child Health & Human Development/NIH
Elizabeth Conibear, University of British Columbia

Mitosis and Meiosis
Sue Biggins, Fred Hutchinson Cancer Research Center
Dean Dawson, Oklahoma Medical Research Foundation

Molecular Motors: Alone and in Groups
Gijsje Koenderink, Institute for Atomic and Molecular Physics
Daniela Nicastro, Brandeis University

Neuronal Cell Biology
Michael D. Ehlers, Duke University Medical Center/HHMI
Franck Polleux, University of North Carolina at Chapel Hill

Nuclear Import and Export
Charles N. Cole, Dartmouth Medical School
Richard W. Wozniak, University of Alberta

Nuclear Organization and Dynamics
Sui Huang, Northwestern University Feinberg School of Medicine
Susan R. Wente, Vanderbilt University Medical Center

Prokaryotic Cell Biology
Zemer Gitai, Princeton University
David Z. Rudner, Harvard Medical School

Protein Folding
Elizabeth Craig, University of Wisconsin–Madison
Suzannah L. Rutherford, Fred Hutchinson Cancer Research Center

Regulatory Roles of Lipid Microdomains
Barbara A. Baird, Cornell University
Michael Edidin, Johns Hopkins School of Medicine

Results of Working Group Discussion
R. Dyche Mullins, University of California, San Francisco, Moderator

RNA Silencing Mechanisms
Natasha J. Caplen, National Cancer Institute/NIH
Alla Grishok, Massachusetts Institute of Technology

Signaling through Cell Adhesion Proteins
David A. Calderwood, Yale University School of Medicine
Masatoshi Takeichi, RIKEN Center for Developmental Biology

Stem Cell Niches
Leanne Jones, Salk Institute for Biological Studies
Haifan Lin, Yale University

X-ylation and Cell Signaling
Holly A. Ingraham, University of California, San Francisco
Kim Orth, University of Texas Southwestern Medical Center

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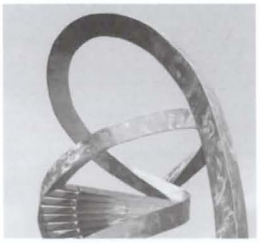

Editorial

It has been some time since the last BSCB newsletter but I can assure you that this is intentional! Following extensive discussions, the committee has decided to re-evaluate the timing of publications of the twice annual newsletter. The current issue, hopefully reaching you in early autumn, is aimed at the start of the academic year and one main aim is that we raise awareness of the BSCB to potential new members including new postgraduate students, postdocs and other researchers who might not previously have joined. The society continues to provide excellent value for money, notably for those eligible for the very generous Honor Fell Travel Awards. All involved in the BSCB would urge you to encourage potential new members to join and hope that you will display the enclosed meeting poster prominently.

Due to the slight delay in publishing this issue, we have a greater than usual number of meeting reports, these provide an interesting snapshot of a variety of fields within cell biology as well as more generally, as illustrated by the ASCB reports. In addition, we continue our series of institute profiles with articles on two new buildings in Cambridge, and include some potentially more controversial content from Tim Levine regarding the presentation of data for those who are colour-blind. This excellent article suggests was to overcome this issue as well as evaluating some of the previously proposed solutions. This is very well worth reading as it could have a significant impact on the perception of your latest grant or paper. Tim has spent a great deal of effort on this and we welcome feedback on it. We hope to feature more content along these lines in future and are happy to open our pages to discussion on these and other topics of great relevance to the cell biology community.

We hope that you continue to enjoy the newsletter and are able to contribute to it. We thank Tim for his excellent article and also Juliet Coates for the stunning cover images which Tim then used to illustrate one of his points. If you have any comments or suggestions for future content, please do contact me.

Please note that we have now moved entirely to an electronic application process for membership. This replaces previous application forms that were published in the newsletters. Forms for membership and direct debit are available on the website.

The next newsletter should be published in the Spring of 2008.

The Editor: David Stephens
(david.stephens@bristol.ac.uk)

The cover images, kindly provided by Juliet Coates (School of Biosciences, University of Birmingham), show confocal projections of *Arabidopsis* hypocotyl cells expressing a GFP-Microtubule Associated protein 4 (MAP4) fusion protein in green (labelling the microtubules) with the chloroplasts fluorescing in red. The lower part of this image has then been re-coloured to facilitate better viewing by those who are red–green colour blind. This important subject is discussed in depth by Tim Levine on page 27.

Newsletter editor: David Stephens **Production:** Giles Newton **Website:** www.bscb.org **Printer:** Hobbs

News

Hooke Medal Winner 2007: Dr Tomo Tanaka

The winner of the 2007 Hooke Medal was Dr Tomoyuki (Tomo) Tanaka. Tomo received a medical degree from the University of Tokyo and then carried out residences in Tokyo and Jishi Medical Schools.

His love of cell biology started when he undertook a postdoc in the Institute of Molecular Pathology in Vienna, and 5 years ago he was appointed as an principal investigator in the School of Life Sciences in the University of Dundee.

The Hooke medal is awarded annually to an emerging leader in cell biology working in the UK and Tomo is undoubtedly a worthy recipient of this award. Both as a postdoc and as an independent team leader he has made a series of important and insightful contributions to our knowledge of how chromosomes attach to the spindle to ensure that the two copies of the genome are accurately separated to the daughter cells. He has combined the advantages of genetic analysis in budding yeast with cell biology and developed elegant assays for visualising how chromosomes capture microtubules in living cells, and used these to study both the capture process itself and how errors in attachment can be corrected.

Tomo has demonstrated that microtubules first attach to a kinetochore sideways on and that the kinetochore can then slide to the end of the microtubule. The yeast cell ensures that the two sister chromatids are attached to opposite poles of the spindle by using the Ipl1 kinase to destabilise microtubules unless the two sisters are pulled in opposite directions and, therefore, are under tension. Tomo was awarded the Hooke Medal at the BSCB 2007 Spring Meeting in Edinburgh where he gave an illuminating talk to a full and appreciative audience.

HHMI and Wellcome Trust link up to benefit postdocs

The Howard Hughes Medical Institute (HHMI) in the USA and the Wellcome Trust in the UK recently launched a program that will allow fellows funded by either programme to spend a year in a lab of their transatlantic allies.

This aim is that the program will expose postdocs to potential collaborators, to allow them to learn different skills, and to enhance possibilities for interdisciplinary science.

Participants in the program will also network with investigators funded by other sources. This arrangement extends the career prospects for participating postdocs, reducing the single affiliation to a principal investigator or even single lab.

Full details of the programme can be found on the Wellcome Trust website but briefly, the programme "enables postdoctoral researchers working in the laboratory of a Wellcome Trust senior or principal research fellow, a programme grant holder in a UK Wellcome Trust Centre, or an investigator at the Sanger Institute to join the laboratory of an HHMI investigator at an HHMI host university, hospital or research institute in the USA, or of an HHMI group leader or fellow at the Janelia Farm Research Campus, Virginia, USA, to carry out collaborative research for a period of three months to one year".

Annual meetings for ELSO

Europe's major life science meeting, ELSO, has reverted to an annual format from 2007 onwards. ELSO announced that the 2008 meeting will run from 30th August to 2nd September in Nice, France. This will be followed by September meetings in 2009 in Amsterdam (Netherlands) and in 2010 in Dresden (Germany) and in 2011 again in Amsterdam (Netherlands). ELSO aims to maintain the highest standards for its meeting as well as providing a forum for discussion of critical issues. With the start of the European Research Council in 2007, these meetings provide an excellent forum to bridge the boundaries between countries and disciplines and meet your European scientific colleagues.

Graham Warren moves to Vienna

Earlier this year, Graham Warren moved from Yale University in the USA to take office as the first Scientific Director of the Max F. Perutz Laboratories in Vienna, Austria. He holds a joint Professorship for Molecular Biology at the University of Vienna and the Medical University of Vienna, the two institutions, which both harbour strong research groups in the field of Molecular Biology. The Max F. Perutz Laboratories have been created as a joint venture, with a strong focus on the promotion of young scientists, and on increasing cooperation with the research institutes and companies at the Campus Vienna Biocenter.

Graham has maintained his presence at the forefront of cell biology throughout his career. He is a regular visitor and contributor to BSCB meetings, most recently at the 2006 Imaging Membrane Dynamics meeting. Graham worked as a group leader at EMBL, Heidelberg, Germany; he then held a Chair of Biochemistry at Dundee in Scotland, followed by a position as Principal Scientist in London, UK, and a Professorship of Cell Biology at Yale University School of Medicine, USA. Graham has been honoured with Fellowship of the Royal Society and, in addition to his ground-breaking research work, is member of the Editorial Board of many renowned scientific journals.

Graham's career is notable for the number of highly successful 'scientific progeny' from his lab. These include many notable cell biologists such as Martin Lowe (University of Manchester, UK), Catherine Rabouille (University of Utrecht, Netherlands), Hemmo Meyer (ETH, Zurich), Tom Misteli (NIH, USA), Tim Levine (Institute of Ophthalmology, UK), and Francis Barr – who has recently taken up a new position as North West Cancer Research Fund Chair of Molecular Oncology based in the Division of Surgery and Oncology, in the School of Cancer Studies at the University of Liverpool.

Frank Gannon retires from EMBO

Frank Gannon has retired as Executive Director of EMBO and has become Director General of Science Foundation Ireland. Having led EMBO for over 13 years, Professor Gannon has overseen a huge expansion of EMBO and its activities. In addition to expanding EMBO's established Fellowship and Courses & Workshops Programmes, he introduced career development initiatives such as the Young Investigator Programme and launched two new journals, *EMBO reports* and *Molecular Systems Biology*. Under his guidance, EMBO now pursues an active Science & Society Programme and plays an increasing advisory role in policy-making arenas, one example being its leadership in promoting the establishment of the European Research Council. His directorship has also seen EMBO offer special support to member states with less developed scientific infrastructures and opened up the organisation to greater interactions with scientists outside Europe. Tim Hunt, Chair of the EMBO Council, commented: "Frank's most significant legacy to EMBO will be the tremendous ties he has built up with the scientific community. Frank has brought the EMBO Members into every layer of the organisation's activities, ensuring that a strong network of scientific excellence lies behind all EMBO actions. Under Frank's energetic and intelligent leadership, EMBO's reputation and influence have never been higher."

In brief...

MEMBER BENEFITS

Did you know that your BSCB membership includes discounted journal subscriptions (including *Journal of Cell Science*, Traffic), and discounts on Wiley and Oxford University Press books? One-off discounts are also available including for the newly released textbook 'Cells' by Benjamin Lewin *et al*. The book includes a chapter on 'Intermediate filaments' by former BSCB Secretary Professor Birgit Lane. 'Cells' will retail in the UK and Europe at about £38.99 but BSCB members can obtain it at the special price of £33.00 inc p&p. To take advantage of this offer please contact Christine Gribble at cgribble@jbpub.com or phone 01842 878586. These discounts more than compensate for society membership fees so do encourage your friends and colleagues to join. Students also benefit from reduced membership fees so do encourage any new postgraduate students joining you in the autumn to join the BSCB. Further details of all member benefits and the new secure online form for membership applications can be found at www.bscb.org

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. Request for funds should be sent to the Treasurer, Mark Marsh, accompanied where possible by a report of a previous meeting. If a meeting receives support, a report from that 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 (bscb@biologists.com).

ARCHIVED NEWSLETTERS ONLINE

Previous versions of the BSCB Newsletter are now available on the BSCB website; so, if you lose your copy then you will still have access to all of the content. Further changes to the website will be taking place shortly as part of its re-launch. www.bscb.org

The Wellcome Collection

183 Euston Road is open again. Once Wellcome Trust HQ, it has been under wraps for years. Now, having sumptuously refurbished the building, the Wellcome have returned to it their library and added their art collection. On 20th June, they held a Gala Evening to declare it open. It was a glittering affair: artists, clinicians, curators amd London's canapé scientists thronged the new hall My date was your very own BSCB President.

The Wellcome Collection is magnificent. Begun by Sir Henry as a collection of medically related art and objects, it has been swollen by years of collecting. There are drawings by Leonardo, Warhol prints, Bolivian masks, fakir sandals, Shinto shrines, Algerian amulets, walls of glassware, enema syringes and a surprising amount of erotica. The entire human genome is there printed in 4pt font and bound in a series of fat, white, glossy, volumes. There is a temporary exhibit devoted to the heart: the heart medical, spiritual, mythological, comparative; there's even room for the heart sentimental. Much of the best of sci-art is here and it as moving as any Renaissance painting. The Wellcome Collection is simply one of London's greatest museums. It's our Getty on the Euston Road.

But, in truth, the guests at the opening didn't have time to take it all in. The Wellcome had done their Gala Opening in style and invited two living treasures, James Watson and Stephen Fry to speak. Watson went first. Now 79, he has taken on the appearance and habits of the irresponsible old. Grinning amiably, he first charmed and then outraged every scientist in the room with meandering reflections on the human genome and what it will tell us about ourselves and would have told us about Rosalind Franklin had she still been alive. Stephen Fry then took the stage. To our relief he mostly talked about London's railway stations.

Armand Leroi

BSCB student and postdoc reps

The BSCB wants to represent all of the cell biology community in the UK and in particular to make sure that the younger generation of scientists have a voice. After a call for volunteers at the annual Spring meeting in Edinburgh, Katie Fisher (PhD student in Oxford) and John-Pierre Eid (postdoc at University College London) have been co-opted onto the committee. Other societies already have student reps but we feel strongly that we also want to hear what our postdocs want from the society. So a very big thank you to Katie and Jean-Pierre was taking on this challenge. They have only just joined but if you have suggestions for them, their contact details are in this newsletter. The two new reps are:

Katherine Fisher
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"After completing my undergraduate degree in Chemistry at the University of Nottingham I began my graduate degree through the Life Sciences Interface Doctoral Training Centre here in Oxford. After a foundation year of short courses and projects I am now working for a D.Phil at the Department of Zoology with Dr James Wakefield, co-supervised by Dr. Charlotte Deane, Department of Statistics. I am currently investigating mitotic microtubule associated proteins in Drosophila from both cell biological and bioinformatics perspectives."

Jean-Pierre Eid
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United Kingdom
Tel. +44 (0)20 7679 4470
Email: dmcbjpe@ucl.ac.uk

"I am a Career Development Fellow at the MRC Cell Biology Unit, at UCL, working in the lab of Dr Nathalie Franc, studying innate immunity in Drosophila, specifically aiming to understand the mechanisms that macrophages employ to engulf apoptotic cells (phagocytosis of apoptotic cells). I did my PhD in the Department of Anatomy and Cell Biology at The University of Melbourne, in the labs of A/P Marie Dziadek and Dr Gary Hime, and my work was on characterising the role of dSTIM (Drosophila homologue of mammalian candidate tumour suppressors, STIM1 and STIM2) in signalling.

School News

A 'telescope' for Cell Biology

Sir Paul Nurse, when living in the UK, spent much of his lab time looking down a microscope and his spare time at night looking upwards through his telescope. In the day time he looked at the very small; at night the very large.

Those of you who are interested in astronomy will possibly know that students and schools in the UK can obtain free access to several robotic high-tech world class telescopes. These telescopes are located in different parts of the world and accessed by pupils through Internet links. The three telescope websites are the Faulkes Telescope at the University of Cardiff, the Bradford Robotic Telescope at the University of Bradford and the National School's Observatory at Liverpool John Moore's University.

£9 million Faulkes Telescope Trust

The Faulkes telescope project has two telescopes one located in Hawaii (Faulkes North) and the other in Australia (Faulkes South). The project was funded by Dr Dill Faulkes a British entrepreneur who set up the Trust because he was concerned at the declining interest taken by children in maths and science.

What has this to do with cell biology?

A lot! Up to now we have not had an equivalent facility for cell biology.

It has been reported that 'A' level (AS and A) biology is seen by pupils as the second hardest 'A' level subject, mainly because of the amount of information to be remembered. Within the subject, cell biology is considered particularly difficult probably because pupils have no idea what, for example, a mitochondrion really looks like. Add to this the fact that, on their own admission, many biology teachers do not feel confident about teaching aspects of 'new' biology and you have a communication and enthusiasm problem. The Royal Microscopical Society is doing sterling work in getting more microscopes into schools at all levels but, as BSCB members will know, it takes rather special microscopes and preparation techniques to see what certain cell inclusions really look like. The chances of special microscopes ever being available in schools are remote and even if a generous benefactor provided them, the operating and maintenance costs would be unsustainable. It is important that pupils are able if possible to 'connect' and visualise the cell inclusions they are studying. High quality images are now available so they should have access to them.

What is the BSCB, doing about it?

It is doing something!

There are two initiatives. Firstly there is **softCELL** the BSCB e-learning pages on the society website. The BSCB was one of the first professional society sites to offer web based learning pages for teachers and learners. Others have followed.

Secondly it is collaborating with Professor Paul Luzio, Director, Cambridge Institute for Medical Research (CIMR) to produce a 'telescope type project' for cell biology. Professor Clare Isacke as BSCB President leads the collaboration for the BSCB. Professor Michael Reiss of the Institute of Education, University of London and Professor Richard Iggo of University of St Andrews are also associated with the project.

The aim of the project is to provide students and schools with interpreted images and video clips produced using research level imaging equipment and techniques such as scanning electron microscopy and fluorescent stains. A 'proof of concept' site called **CELLpics** is now under construction and can be seen at **cellpics.cimr.cam.ac.uk**

The site is not a library but will be a collection of images selected to illustrate specific points. These are interpreted using interactive pop-up notes, links to text in the BSCB softCELL site and by a novel CIMR GridPoint device. The device, produced as a result of a link between David Archer (of BSCB) and Matthew Gratian (of CIMR), uses a mouse controlled crossed hairs pointer to locate a position on the image. From this an alphanumeric grid reference can be used to define it. The system can be used for learning, teaching and testing but it is also hoped that these interpreted images will provide inspiration and enjoyment and enthuse people, especially the young, to study cell biology.

On the CELLpics website there are examples of the various ways it is hoped to interpret images, animations and video clips. With video clips it is hoped to use not only stop/start facilities but also the CIMR Gridpoint to describe specific events. Further specific images are now being sought (see below) from a variety of providers but costs have to be kept to a minimum for this free access site for education.

What you can do to help

Tell people about the site. Especially tell pupils, teachers and others interested at, for example, Open Days.

If you have an image in electronic form, or video clip you can spare, and you think it could be useful, please let us know. It would be best to check to see whether the topic is already covered, or an image is under preparation.

We need to know something about the image so that we can interpret it. An image of a sperm from mouse stained to show microtubules, or a section from the left ventricle of a heart cell from rat showing mitochondria is greatly preferable to "a section of a cell showing part of a mitochondrion". Part of the aim is to interpret images in a real and connectable context.

If you have such an image please contact Matthew J Gratian, Computer Associate, CIMR-Microscopy, Wellcome/MRC Building, Hills Road, Cambridge, CB2 0XY email: mjg85@cam.ac.uk who is curating the images. Matthew will then contact me and we will then decide upon the technical and interpretable suitability of the image.

Thank you for taking the time to read this item and for your interest in the project. It really would be worthwhile to help enthuse the next generation

David Archer
Schools' Liaison Officer, BSCB

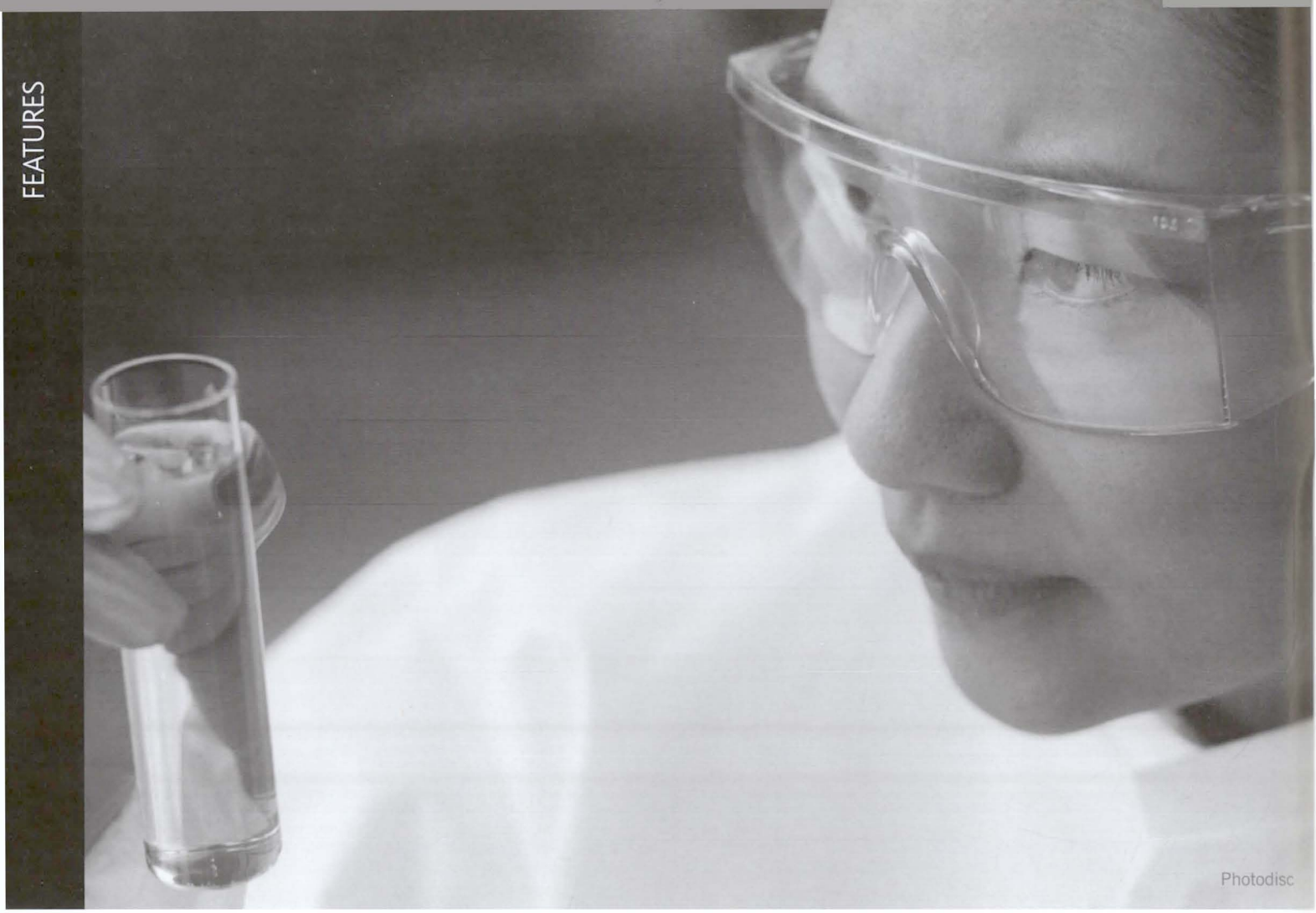
Links

Telescope websites referred to in the text.

faulkes-telescope.com
(Cardiff)

www.telescope.org
(Bradford)

www.schoolsobservatory.org.uk
(Liverpool John Moore's)



Photodisc

The status of women in the European life sciences

Approximately half of the graduate students in the molecular life sciences in Europe are women. These students are selected for their academic achievements and their potential to perform well as scientists; clearly, selection committees and PhD supervisors believe that men and women are equal in their intellectual and research capabilities. Nevertheless, when we plot the percentage of women holding predoctoral, postdoctoral, junior group leader and professor positions we see a steady and dramatic decline in the proportion of women at the more advanced career stages[1]. Women made up only 11.3% of senior faculty positions in natural sciences in the European Union in 2004[2]. Inextricably related to this, women are under-represented in elite national and international scientific societies, they receive less grant support and fewer merit awards than men, and they are in the minority among speakers at conferences.

Governments and scientific organizations are concerned about the loss of women from science, because they provide the resources for scientific education and training; they expect that this investment will provide returns in the form of discovery and technological innovation. If most women with PhDs eventually leave the system, this is a huge waste of education and training, not to mention talent. Because women are also underrepresented in business and industry[3], it is clear that the loss of female talent is not specific to academia alone. More long-term studies are needed to answer the important and nagging question: what happens to the women who leave science?

Grounds for optimism

Beyond the fates of individuals, new studies demonstrate other reasons to pursue gender equity in science: research productivity increases in labs when there is a good balance of gender, and gender-balanced teams are more able to find solutions to problems than

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Karla Neugebauer is a group leader at the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, Germany, and a member of the Career Development Committee of ELSO. She currently manages ELSO's Database of Expert Women in the Molecular Life Sciences (www.elso-cdc.org/).

Abbreviations: ELSO, European Life Scientist Organization; EC, European Commission; EMBO, European Molecular Biology Organization.

are single-gender teams[3]. Business and industry are also starting to realise that identifying the right work–life balance for their employees will enable them to recruit and retain productive men and women researchers.

Equal Potential

So, Europeans are asking, "Why do women drop out of academia?" And, "What can be done?" In May 2007, a conference entitled Women in Science: The Way Forward – sponsored by the European Commission's SET-Routes network – took place in Heidelberg to examine these issues. It is clearly difficult to answer the 'why' question. Employment conditions (salaries, the availability and cost of child-care, maternity and paternity leave policies, flexibility of working hours, attitudes towards both women and science) play a role, although they vary among countries. In Sweden, for example, employment conditions are very family-friendly; even so, the gender-gap remains at the level of top positions in academia.

Many other important factors are less tangible (early childhood education and upbringing, unconscious bias). Exciting talks by social scientists at the conference explored how very young children are socialised to believe that girls are less interested in or good at maths and science and how both men and women unconsciously associate men with careers and science and women with family. On the other hand, there is compelling evidence that few differences between the sexes exist when it comes to performance in verbal and mathematical tests[4,5], consistent with the fact that men and women are accepted in equal numbers as undergraduates and PhD students. Women and men seem to begin their careers with equal potential for success.

The Leaky Pipeline

The practical discussion now focuses largely on the 'leaky pipeline', in which fewer female PhDs in maths and science progress to the highest positions compared to their male peers. Some believe that the leaky pipeline is self-correcting, assuming that women currently in training phases will move into senior positions over time. Longitudinal data show that this is clearly a fallacy[1,2]. Many believe that women leave science, because having children compromises their ability to succeed on a competitive career track. Isabel Beuter of the Centre of Excellence Women in Science (CEWS) cited a study by Inken Lind, analysing research on successful women with and without children. Having children produced no measurable delays in career stage progression and no difference in publication productivity. This shows that successful women are not hindered by motherhood. More studies are needed, however, to determine whether women who failed to progress did so because they had or planned to have children.

A related possibility is that women scientists in dual-career families may move (more often than men) due to their partners' careers and to the detriment of their own. Beuter and others conclude that the relative value society and individuals place on women's careers compared to men's and inherent stereotypes about men's and women's interests and abilities may be the most pertinent factors hindering women's progress within academic structures.

Stopping the leak

What can we do? The main thrust is to avoid the accumulation of small disadvantages that seems to plague women's progress up the career ladder.

The first strategy is financial; it aims to retain women at the postdoctoral level. A number of fellowships specifically for women are now available; for instance, a variety of awards are sponsored by L'Oreal-UNESCO (wwww.forwomeninscience.com). Several programs aim to support women returning to science from a career break; examples are the Daphne Jackson Trust (www.daphnejackson.org/) and the Marie Heim-Vögtlin Program of the Swiss National Foundation (www.snf.ch). An unusual award made through the Nüsslein-Volhard Stiftung (www.cnv-stiftung.de/) provides funds for home help for women graduate students with young children; it aims to minimise their time doing household chores in favour of time in the lab and quality time with their kids.

Second, mentoring for women at all career stages is crucial. Women should seek senior mentors both within and outside their institutions who can provide them with the benefits of their experience, reputation and connections.

Third, women can profit from training in leadership, negotiation and presentation skills, which can enable them to navigate an environment that is not currently gender-neutral. Several American participants at the SET-Routes meeting emphasised the importance of training all academics – male and female – in best practice, especially on committees carrying out the 'gate-keeping' functions of recruitment, evaluation, and promotion. Along these lines, leadership is clearly seen to be important: when heads of departments and institutes strive for gender balance, family-friendly policies are pursued and women are recruited.

When it comes to recruiting women into faculty positions, a common complaint is that the proportion of applications from women is too low. This reflects the current mechanism for soliciting applications in basic science: place an advertisement in *Nature* and *Science* and wait to see what arrives in the mail. If only 5–10% of applications are from women, it is unlikely that one will be hired unless gender is made a priority in the hiring process. Science is, above all, driven by excellence, so no-one wants to select his or her next colleague solely because she is a woman. Prior evidence suggests that this kind of affirmative action does not work in science[1]. A viable alternative is to increase the number of female applicants for each job and then select the best person. When the proportion of women applicants increases, more women will rise to the top.

How can search committees identify qualified women in a desired field in order to solicit applications for faculty positions? Recently, ELSO created a **Database of Expert Women in the Molecular Life Sciences**. This database is unique, because it is for experts: molecular life scientists know what to expect from experts in their fields – publications in international journals, keywords we all understand, and career stages that are familiar to us. An expert woman can register if she is of European nationality or working in Europe, and she must be first or last author of at least one paper in a major international journal within the last three years. Over 400 women experts, from postdocs to senior group leaders, are currently registered in the database. This is one resource scientists can use to find women with appropriate expertise.

The broad aim of the Database of Expert Women is to increase the visibility of European women who are already successful at various career stages. Thus, the database also helps organizers of scientific meetings to identify women to invite as speakers and chairs. It has become unacceptable to organize an international meeting without a reasonable number of women on the invited speaker list; ELSO recommends a target of 35% women. Indeed, sponsors European meetings, such as EMBO and the Federation of European Biochemical Societies, stipulate that gender balance should be considered when assembling the speaker list. Nevertheless, it is still true today that too many European meetings feature no or amazingly few women speakers. (If you are frustrated by this, you can download a letter to conference organizers from the ELSO Career Development Committee web pages.) The database can draw attention to more junior women whose names may not at first spring to mind.

Moreover, our peer review system, by its very name, requires that gender balance be considered when assembling commissions, grant review panels, and editorial boards, as well as ad hoc reviewers contributing to all three. ELSO has received positive feedback from a number of granting organizations and journal editorial boards. The Human Frontiers Science Program, for example, uses the database to identify potential reviewers and aspires to have 30% women on its grant reviewing panels.

Scientific organizations can do a lot, and ELSO's Database of Expert Women in the Molecular Life Sciences is an example. Another important role of scientific organizations is simply to increase awareness by sponsoring events, providing information and links online, and creating a receptive environment where concerns can be raised and discussed. Working towards gender equity benefits both the women and the men in scientific organizations.

This article first appeared in English in issue 3-2007 of Lab Times (www.lab-times.org). It is reproduced with permission from LJ-Verlag, 79249 Merzhausen, Germany.

Further Reading

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Further information

Further information on women in Science and links to mentoring and funding resources can be found on:

ELSO Career Development Committee pages and Database of Expert Women in the Molecular Life Sciences www.elso-cdc.org/

EMBO Women in Science pages
www.embo.org/gender/links.html

European Commission Science & Society pages
europa.esn.be/comm/research/science-society/home_en.cfm

SET-Routes www.set-routes.org

The Cancer Research UK Cambridge Research Institute

The Cambridge Research Institute (CRI) is the result of a unique partnership between the University of Cambridge and Cancer Research UK. CRI is housed in the Li Ka Shing Centre on the Cambridge Biomedical Campus. It was officially opened on 2 February 2007 by Her Majesty The Queen, patron of Cancer Research UK, and HRH The Duke of Edinburgh, Chancellor of the University of Cambridge. The Institute is a dedicated state-of-the-art research facility that will harness the scientific strengths of Cambridge to address the prevention, diagnosis and treatment of cancer. The main aim of the new Institute is to create an exciting environment of interdisciplinary collaboration so that researchers in many different fields will be able to work together with the single aim of beating cancer.

Fund-raising

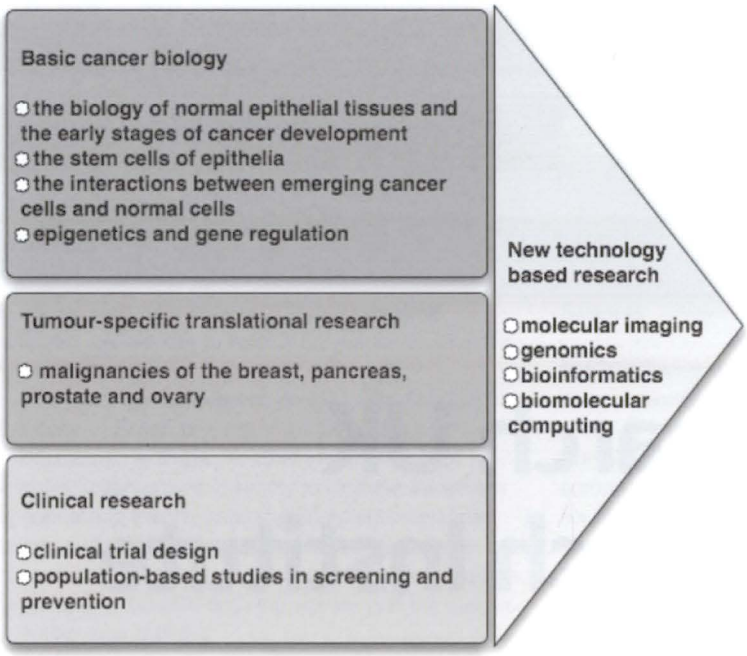
Construction of the £50 million Li Ka Shing Centre on the Cambridge Biomedical Campus was funded jointly by Cambridge University, Hutchinson Whampoa Ltd, Cancer Research UK and The Atlantic Philanthropies, plus a range of other donors. Sir Ka-shing Li has long been a sponsor of cancer research at the University of Cambridge, support that was instrumental in the University securing the new Institute. A further recent gift from the Li Ka Shing Foundation associated with CRI is a new Professorship in Oncology at the University.

Cancer research has been put on fast-forward in Cambridge:

Cancer Research UK has purchased approximately £15 million worth of the latest equipment for the Institute, funded through generous donations. Cancer Research UK will also provide around £20 million per year to core-fund research at the Institute an equivalent to about 75% of the Institute's annual operating costs. The remainder will be sourced from other UK and European funding bodies. The core-funded structure ensures that Group Leaders receive a substantial element of stable funding, which provide the security to tackle important and challenging questions. CRI provides scientists with access to a number of in-house facilities at the very forefront of technology including genomics, flow cytometry, histopathology, microscopy, in situ hybridisation and bioinformatics. CRI also houses an ultrasound machine and a nuclear magnetic resonance facility.

People

Eventually, more than 300 scientists in up to 30 research groups will be based at the Institute. Currently, CRI is a little over half full with 16 scientific groups already in place. Further recruitment rounds are expected to fill up the remaining space over the next few years. The Institute is led by **Bruce Ponder**, Director and Li Ka Shing Professor of Oncology, whose research covers the genetics of breast cancer, and **Fiona Watt**, Deputy Director and holder of the Herschel Smith Professorship of Molecular Genetics, who studies the link between stem cells and cancer. Other research at CRI will range from cell biology to imaging and experimental medicine.



RESEARCH

The principle research goal of CRI is to develop novel applications in cancer detection, treatment and prognosis, based on high quality basic research. Ongoing research activity clearly reflects this idea, where basic and translational sciences co-exist not only within the building but also within individual laboratories. Research at the institute is built around four major schemes.

Basic Cancer Biology

More than 80% of human cancers are of epithelial origin, therefore research activities at CRI concentrate strongly on epithelial biology. To a large extent, tumourigenesis exploits the molecular pathways that are otherwise responsible for the normal development, regeneration and homeostasis of tissues. Thus, to efficiently combat cancer, we need to gain a better understanding of how normal epithelium functions not only on molecular and cellular but also on multicellular levels. Once, molecular pathways are clearly defined, and cellular interactions are mapped, we will be in the position to study how the breakdown of these processes contributes to tumour formation.

Until recently, all cells within a tumour have been regarded as equal. Recent advances, however, strongly challenge this view. Most tumours, whilst clonal in origin, contain distinct populations of cells on the basis of their proliferative potential. Surprisingly, only a very small percentage of cells within a tumour appears to have a capacity to self-renew. Such 'cancer stem cells' are responsible for populating the tumour, and alarmingly, may also be more resistant to chemotherapy. Therefore, pinpointing the molecular differences between cancer stem cells and their progeny that form the bulk of the tumour, is a crucial step towards more effective future therapies. Cancer stem cells are thought to resemble adult stem cells in their behaviour, however, the relation between epithelial stem cells and epithelial cancer stem cells is still not well established.

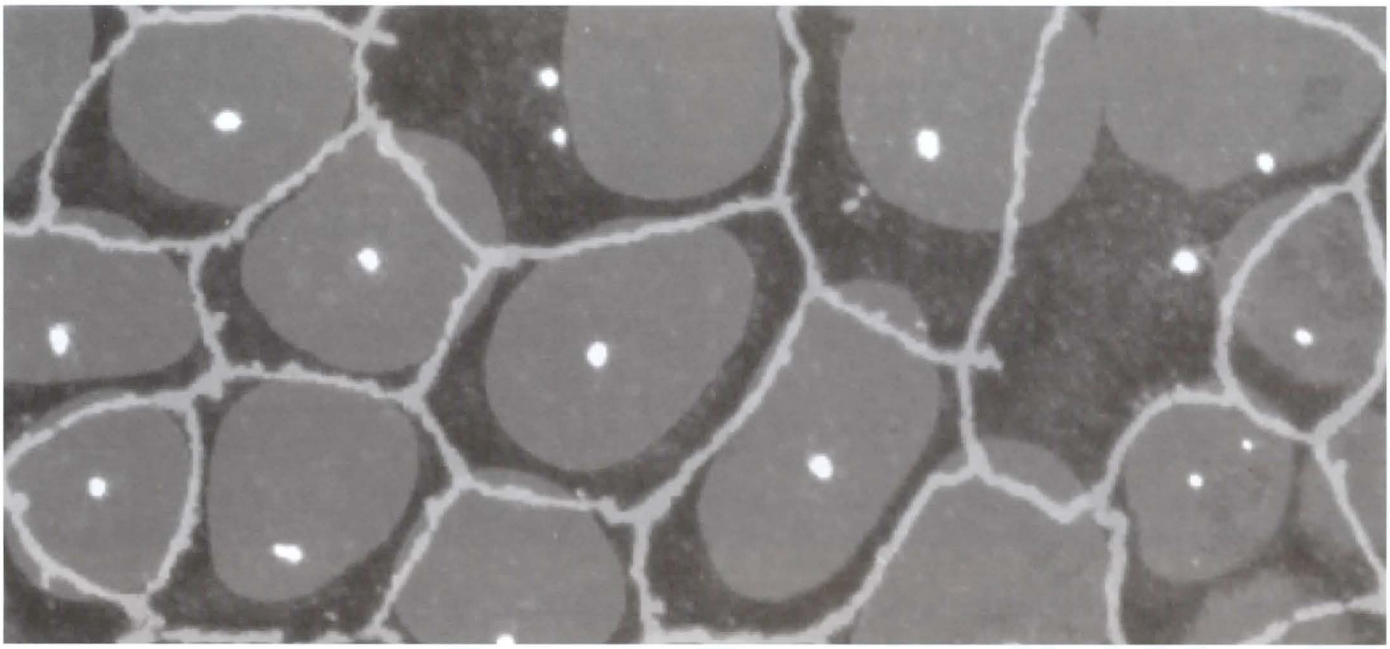
Within the CRI, at least two laboratories investigate the basic biology of epithelial stem cells and their role in cancer. **Fiona Watt's** group studies the proliferation and differentiation of epidermal stem cells. The epidermis frequently develops tumours as a result of sustained environmental assaults, such as UV irradiation and exposure to chemicals. Fiona Watt's scientific interest ranges from isolating cancer stem cells from such tumours, to understanding how the differentiating cells of the epidermis can influence tumour development. **Doug Winton's** team focuses on the identification and molecular properties of intestinal stem cells. A particular goal of theirs is to develop clonal approaches in which gene specific mutations are switched on as sporadic events in individual cells. Such experiments will closely mimic the genetic changes that occur in early tumourigenesis.

Importantly, even unruly cancer stem cells are unable to grow into large tumours without re-shaping their environment, breaking old and forming new attachments and attracting blood vessels. Tumour microenvironment and cell-cell interactions form the basis of the research efforts in **Gillian Murphy's** laboratory. Naturally, changes in gene expression, reversible and irreversible chromatin alterations, cell cycle abnormalities and aneuploidy could all contribute to tumourigenesis. Epigenetic alterations, imprinting, senescence and aneuploidy are the focus of several laboratories at CRI.

Tumour-specific research

Several scientific groups headed by clinically trained principal investigators at CRI have selected a particular epithelial cancer as their focus of research. These include malignancies of the breast (Carlos Caldas), pancreas (David Tuveson), prostate (David Neal) and ovary (James Brenton). These groups use a combination of molecular biology and large-scale genomic approaches to understand the evolution of the disease, to identify prognostic markers and to look for molecular causes of disease relapse or resistance to treatment.

The primary focus of **David Tuveson's** group is pancreatic cancer, one of the deadliest of human tumours. In the centre of their interest is a transgenic mouse model Tuveson established a few years ago. 90% of human pancreatic cancers contain oncogenic activating mutations in the K-ras gene. Mice, engineered to carry the same mutation, replicate many of the clinical features associated with human pancreatic tumours. Therefore, they provide a useful tool to map out the pathway of malignant transformations responsible for early pancreatic tumour formation. Furthermore, these transgenic mice can be used for pre-clinical therapeutic testing, an approach that is currently being developed at CRI.



Fanni Gergeley

David Neal's team have chosen prostate cancer as their primary focus. A primary driver of hormonal response in the prostate is the androgen receptor. While, prostate cancer can be effectively treated by a combination of surgery, radiation and hormone- therapy, resistance to hormone-therapy often arises after a few years of treatment. One of the causes of hormone therapy failure is that cells within a tumour become androgen-independent for their growth. Investigating the molecular basis of the transition to androgen-independent prostate cancer, therefore, will provide important new biomarkers as well as potential therapeutic targets.

Scientists at CRI, have significant expertise in a diversity of cancer genomic areas including molecular classification of human and model organism cancers, mechanisms of drug resistance, novel therapeutic target discovery and validation, cancer stem cells, and mechanisms of gene regulation at the chromatin level. **Carlos Caldas'** group uses genomics tools to analyse breast cancers with the particular interests of characterising pathways of tumourigenesis and epithelial transformation, identifying potential therapeutic targets and validating prognostic markers. **James Brenton's** team employs a mixture of genomic and cell biology approaches to identify the molecular causes of drug resistance in ovarian cancer. **Duncan Odom's** aim is to understand system-level transcriptional mechanisms that are involved in mammalian cell specification in liver hepatocytes and pancreatic beta-cells, while **Jason Carroll's** primary focus is to identify cis-regulatory elements that regulate Estrogen Receptor (ER) transcription and to study molecular mechanisms by which anti-estrogen therapies arrest cell growth. Employing cutting edge approaches, aided by on site bioinformaticians, these groups will also contribute to the development of novel genomic techniques.

Population-based studies

Studies of genetic susceptibility to selected common cancers - breast, prostate, ovarian, oesophagus, stomach - are carried out in close collaboration with the genetic epidemiology groups in the Strangeways Research Laboratories led by **Bruce Ponder**.

NEW-TECHNOLOGY-BASED RESEARCH

Imaging

One of the main strategies to reduce the number of deaths from cancer is to improve early detection of malignancies. At CRI, two groups exclusively focus on clinical imaging techniques. **John Griffiths'** team employs magnetic resonance spectroscopy (MRS) to measure the chemical content of living tissue, permitting investigations of tumour physiology, biochemistry and their change in response to treatment. **Kevin Brindle's** group is studying magnetic resonance imaging contrast agents, based on iron and gadolinium complexes, to monitor specific aspects of tumour biology, in particular apoptosis following therapy. In addition, his group is also investigating the possibility of using nuclear hyperpolarisation as a novel tool for molecular imaging. Both the Griffiths and Brindle groups are interested in metabolomics and they aim to use metabolic profiling of tumours for monitoring treatments and prognosis.

Bioinformatics

Simon Tavaré's bioinformatics team aims to develop novel methods in cancer computational biology to be used in the analysis of data from a variety of microarray technologies including expression, array CGH, methylation and alternative splicing experiments. Their interests also include molecular modelling of cell lineages that could improve our understanding of stem cell fates.

Last but not least, the CRI will provide the focal point for a wider Cambridge Cancer Centre, which aims to integrate the cancer research community in Cambridge. This is a virtual framework that will bring together academic researchers not only in biology, but also in disciplines such as mathematics, physics, chemistry and engineering; biotechnology and pharmaceutical companies; and clinicians and National Health Service providers across Cambridge to make progress in cancer research and create tangible benefits for patients.

The Wellcome Trust Centre for Stem Cell Research

The Wellcome Trust Centre for Stem Cell Research (CSCR) has been created to bring together outstanding principal investigators to undertake ground-breaking research into the biological properties and biomedical potential of stem cells.

To create the CSCR, the University of Cambridge has invested £16 million in the refurbishment, equipping and staffing of the former Wellcome Trust/CR-UK Institute. The purpose-redesigned building has dedicated central research laboratories, core facilities, offices and meeting rooms for 140 staff. With £7 million core funding from the Wellcome Trust and a contribution of £1.5 million from each the Medical Research Council and the Wolfson Foundation the Centre will be an international centre of excellence in fundamental stem cell research.

Located in central Cambridge, the Centre is ideally situated for interaction with world-leading groups in the adjacent Gurdon Institute, and in the neighboring Departments of the School of the Biological Sciences. Principal investigators in the Centre are members of the University of Cambridge, formally affiliated to a Department of the School of the Biological Sciences and/or a Department of the Clinical School. Opportunities for interaction between the CSCR researchers and clinical scientists at the Addenbrookes site will be fostered through the Cambridge Stem Cell Initiative. This brings together leading investigators with interests in stem cells and affiliated disciplines from across the entire University. The Cambridge Stem Cell Initiative is the primary conduit for engagement between basic and clinical scientists aimed at biomedical translation of stem cell and regenerative medicine research.

With **Austin Smith**, Medical Research Council Professor of Stem Cell Biology, as Director and **Fiona Watt**, Herchel Professor of Molecular Genetics, as Deputy Director, the Centre will pioneer the next generation of stem cell research. Over a recruitment phase of the next three years the Centre aims to recruit 4 senior and 8 junior principle investigators. In an annual competition, junior principle investigators are selected and sponsored to obtain external fellowship support. In 2007, I was the first junior principle investigator to be appointed. My funding is based on a Career Development Fellowship from Cancer Research UK and a Next Generation Award from the philanthropic Cambridge Stem Cell Board.

The CSCR has an international perspective with scientists worldwide. Fiona Watt is Vice President of the International Society for Stem Cell Research (ISSCR) and Austin Smith is coordinator of the European Consortium for Stem Cell Research (EuroStemCell). Scientists at the CSCR have the common focus on defining the molecular and biomedical mechanisms that control stem cell behavior. Stem cells are defined by the ability to produce both identical daughter cells (self-renewal) and progeny with more restricted fates (commitment and differentiation). These dual capacities of stem cells contribute to growth and diversification during development and sustain homeostasis and repair processes throughout adult life. They also provide a resource for regenerative medicine. Elucidation of the mechanisms that govern stem cell behavior is therefore of fundamental significance in cell, developmental and organismal biology, and the capabilities arising from such knowledge can be anticipated to have major biomedical applications.

To facilitate high quality research, the Centre provides core facilities for stem cell derivation, tissue culture, transgenesis, imaging, histology and FACS, as well as biomedical suites for microinjection, surgery and cryopreservation. The embryonic stem cell core facility will ensure efficient production of customised gene modified stem cells and mice, and provision of human embryonic stem cells. These centralised resources will underpin and accelerate all of the research programmes in the Centre and provide a platform for technological innovation in genetic engineering and bioprocessing and functional screening of stem cells.

At the CSCR, scientists are gathered with interest in complementary areas of embryonic, foetal and adult stem biology, including transcriptional determination of lineage potential, stem cell niches, intracellular signalling, and epigenetic programming and reprogramming. Other research areas, such as leukaemic and cancer stem cells, tissue and organ progenitors, notably pancreatic and cardiac, and genetic and chemical screens for stem cell regulators will also be developed.

From ES cells to tissue stem cells – Stem Cell Programming

The group of **Austin Smith** is analysing the cellular and molecular mechanisms governing the formation, self-renewal and differentiation of pluripotent and tissue-restricted stem cells. Embryonic stem (ES) cells are derived directly from the pluripotential cells of the early mammalian embryo.

ES cells can be propagated and manipulated in vitro whilst retaining the potential to generate every cell type of the organism. Neural stem (NS) cells can similarly be expanded in vitro but are restricted to generating cell types of the central nervous system. The aim is to identify, characterise and understand the regulatory processes and machinery that govern self-renewal and lineage programming in these two stem cell types. Austin Smith's laboratory has shown that ES cell self-renewal is maintained by the interplay of extrinsic growth factor signals, LIF and BMP, and intrinsic transcriptional determinants, Oct4 and Nanog

Epidermal stem cell self-renewal and lineage commitment

Fiona Watt's laboratory studies the adult mammalian epidermis, the outer covering of the skin. Adult epidermal stem cells self-renew but also produce progeny that undergo terminal differentiation along the lineages of the hair follicles (HF), sebaceous glands (SG) and interfollicular epidermis (IFE). The best characterised stem cell population resides in a region of the hair follicle known as the bulge.

In addition there are stem cells in the IFE and the sebaceous gland. Stem cells in each location are functionally interconvertible, but normally give rise to a more restricted repertoire of differentiated cells because of local microenvironmental cues. Fiona Watt's group studies factors, such as Integrins and Lrig1 that regulate epidermal stem cell identity and behaviour. One factor that is required to maintain the epidermal stem cell compartment is Rac1 by negatively regulating Myc. Activation of Myc causes exit from the epidermal stem cell compartment and stimulates differentiation into IFE and SG at the expense of the HF lineages. Lineage selection and terminal differentiation into hair is, at least in part, regulated by Wnt signalling. A high level of ?-catenin activation is sufficient to trigger ectopic HF differentiation in the epidermis, while inhibition of activation results in conversion of hair follicles into cysts of interfollicular epidermis.

Fiona Watt's goup uses the epidermis as both a model to study stem cells and to analyse cancer (see Fanni Gergely's report on CRI for more details).

Regulating epidermal stem cell fate and its implication on cancer

Many adult tissues are maintained by stem cells. Failure to control the generation or differentiation of stem cells contributes to cancer. The goal of **Michaela Frye's** laboratory is to identify key regulators and mechanisms that control the maintenance of the epidermis by regulating stem cell growth and differentiation. The transcription factor Myc is well known for its role in tumourigenesis but its functions in non-malignant cells remain enigmatic.

Recent studies have revealed a key role for Myc in regulating adult stem cell homeostasis. Through its interaction with Miz1, Myc regulates the exit of stem cells from their niche by directly repressing adhesive factors. Once the stem cells have left their niche, Myc induces cell proliferation via growth promoting target genes, like the novel RNA methyltransferase Misu. The main focus of the group is to characterise the epigenetic and transcriptional changes regulated by Myc that trigger the exit of epidermal stem cells from their niche and induce differentiation into specific epidermal lineages.

The origin of pluripotent stem cells

Unlike most other model organisms, the early mammalian embryo possesses an amazing capacity to regulate its own development. The evolution of a pluripotent compartment in the blastocyst has enabled the in vitro propagation of embryonic cells.

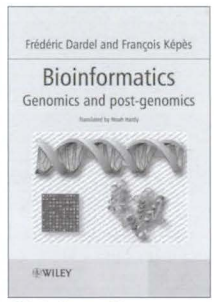
Twenty five years ago the first embryonic stem (ES) cells were derived directly from mouse blastocysts in culture using medium supplemented with serum and a 'feeder layer' of fibroblasts. The process by which ES cells emerge was not understood, but their potential applications were immediately realised to be enormous. Jennifer Nichols's group focuses on the question of how pluripotent cells are assigned and maintained in the embryo; how they can be harnessed and propagated in culture as embryonic stem cell lines and how the process of ES cell derivation can be controlled and improved.

The group of Jennifer Nichols has now devised a culture system in which ES cells can be derived and maintained in feeder-free and serum-free conditions by addition of LIF and BMP4 to the basic culture medium. This medium, with the further addition of basic FGF and human fibroblast feeder cells has enabled the successful derivation of several new human ES cell lines from the inner cell masses of donated human embryos. Addition of selected inhibitors to the culture medium has obviated the requirement for exogenous cytokines for the maintenance and derivation of murine ES cells.

For more information please visit our website at www.cscr.cam.ac.uk

Michaela Frye, Welcome Trust CSCR, Cambridge.

Book Reviews



Bioinformatics: Genomics and Post-Genomics
Frédéric Dardel and François Képès
John Wiley & Sons, Inc.
256 pages
ISBN 0-470-02001-6

Bioinformatics: Genomics and Post-Genomics

FRÉDÉRIC DARDEL AND FRANÇOIS KÉPÈS

We recently marked the fifty-year anniversary of the double helix, and shortly thereafter we have become witnesses to the birth of the genomic era [1]. The elucidation of the genomic sequence of organisms as diverse as viruses and humans is deservedly considered the greatest triumph of molecular biology since the discovery of the DNA double helix [2].

The genomic revolution is expected to change the face of science as we knew it, and to impact practically all biomedical and medical areas. Over the past few years, cancer investigation and treatment, cardiovascular and neurodegenerative medicine [3], autoimmune diseases [4], infectious disease research [5] and other disciplines such as bio-defence [6, 7] and agriculture [8, 9, 10] have all benefited tremendously from the expansion of the -omics disciplines.

In context of the new developments the genomic era has brought, **Bioinformatics: Genomics and Post-Genomics** becomes a fundamental and indispensable resource for undergraduate and early graduate students. The book, insightfully authored by Frédéric Dardel and François Képès, was initially developed as a course taught at the École Polytechnique in France. **Bioinformatics: Genomics and Post-Genomics** represents a valuable resource for students attempting to lay the basic theoretical foundations before engaging more deeply in the study of any of the disciplines converging on genomics, proteomics, bioinformatics, and systems biology. The eight chapters describe concepts ranging from biological sciences to informatics, as they cover basic principles about sequencing, sequence alignment and comparative genomics, structural and functional homologies, structure prediction, simulation of molecular networks, transcriptomics and proteomics.

One area that will benefit tremendously from the genomic revolution, in ways that years ago seemed unthinkable, is drug design. According to recent estimates, only one in 10,000-30,000 synthesized compounds will eventually become a commercial drug, and 12-15 years are currently required from preclinical discovery to the clinical development stages for any given compound [11]. Genomics is promising to reduce drug development time and validate and optimize newly discovered targets, and this emerges as an utmost priority, particularly in context of the increasing numbers of resistant organisms and the breadth of resistance in any single microorganism [12].

While new technological advances will not represent magic wands [13], they will provide an array of unbelievable resources for research and development. As one recent paper remarked so aptly, systems biology provides a new grammar for drug discovery [14]. **Bioinformatics: Genomics and Post-Genomics** will immensely help students in understanding that grammar and in establishing important foundations while shaping their careers.

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Animal Experiments: Simple Truths

VERNON COLEMAN

Not long ago I was chatting with Steven Mithen. We had both written books. Steven had written his well received 'After the Ice' and I had written a book for the Royal Society of Chemistry. Following our writing experiences, we both agreed that anyone who has the patience and tenacity to research and write a book was worthy of praise. We also agreed that what is known as 'signposting' – having a Preface, Introduction and Contents list with chapter and sub-headings and perhaps an Index – not only helped the reader but the writer as well.

Dr. Vernon Coleman has certainly researched material for his book and it contains some interesting information, including a passing mention of the ill-fated clinical trial on six humans of the new drug TGN1412. Apart from the Preface, however, any form of 'signposting' was woefully absent with neither a Contents list nor Index, the book comprising 200 unordered statements mainly about and against vivisection.

The book has been sent to about 6000 school libraries and the accompanying Press Release stated that "School children ...will now have an opportunity to read scientific truths ...and make a sound informed judgment on vivisection" and that "Dr. Coleman takes a cool and dispassionate look at vivisection".

Dr Coleman is far from dispassionate and I would hope that any student who had learned even the most basic critical thinking skills would feel that they could not make a sound judgment from this text alone; it is so unbalanced. I cannot, for example (p40 Item 62), condone the listing of 10 people who have been grossly cruel to animals and murdered humans in a book about animal experiments. They were clearly very deranged people but they were not carrying out scientific experiments on animals. They were

plainly sadistic to all animals, including humans. Having said that, I was pleased to see listed (p86 Item 176) some examples of animals demonstrating protection and help for members of their own species.

Coleman is clearly a very passionate anti-vivisectionist but I would have thought that to support his own case he might have cited the work of 2005 Nobel Prize winner Barry J Marshall. Marshall was awarded the Physiology or Medicine prize for his work on *Heliobacter pylori* during which he experimented on himself by drinking a culture of *Helicobacter*. This was to show that even in a healthy person it could cause gastritis which in turn could lead to a susceptibility to peptic ulcers and sometimes a type of stomach cancer.

So, would I recommend this book? Well, I am not in the habit of being negative about a book so if the school library has a copy I would advise any teacher/librarian to make it available but with a note in the front asking the reader whether they think the book gives a balanced view; whether the points are well made, well ordered and argued, and whether they thought the book was comfortable to navigate. I suspect many students would find the views expressed rather extreme and so through this they would learn how important it is to read a variety of texts, weigh up the evidence and then make up their own mind. I just wish more space had been given to listing positive approaches being made to using useful alternatives to experiments using animals. As any researcher in the field will tell you, animal experiments are both very expensive and time consuming.

David Archer. d.archer@talktalk.net

Cell Imaging: Methods Express

EDITED BY DAVID STEPHENS

Cell imaging has evolved over the years with the improvement of microscopy and the emergence of diverse techniques, becoming an essential integral part of cell and molecular biology research. **Cell Imaging: Methods Express** describes a variety of imaging techniques and offers tips for troubleshooting during investigation of fixed or live cells and tissues.

The book opens with a relatively short but robust chapter on the basics of microscopy. This includes an introduction to fluorescence microscopy and fluorescently labelled molecules, which are nicely summarised in a table accompanied by their photophysical properties. Fluorescence imaging using multiple fluorophores is further explored in Chapter 5.

As cell imaging by microscopy forms in some ways an independent scientific area, combining biology and physics, many biologists may enter an unknown area of physical principles in optics. This generates the problem of the choice of the right equipment for a particular experiment in order to obtain optimal results. Chapter 2 helps the reader to choose between confocal laser scanning microscopy and wide-field microscopy by comparing the pros and cons of these two types of microscopy based on the sensitivity, spatial resolution and speed. Protocols for using both wide-field microscopy and confocal laser scanning microscopy are provided.

Chapter 4 focuses on imaging at the 200nm resolution range, describing methods for imaging subcellular units and events that affect cellular structure, such as apoptosis, using phase-contrast microscopy or differential interference contrast microscopy. Other fluorescent imaging applications, such as time-lapse imaging and FRET microscopy, that are used for live samples, for example to investigate protein-protein interactions, are explained in Chapter 5. Chapter 12 then covers FRET microscopy in more detail. Other methods to study subcellular components and events at the molecular level are described in Chapter 13, where FLIM microscopy is presented as a way to visualize the interaction of a fluorophore under varying environmental conditions, such as changing pH and ion and oxygen concentrations.

Imaging of kinetic events, such as protein motion between organelles and the cytoplasm, using fluorescence photobleaching and photoactivation (e.g. FRAP and FLIP microscopy) is described. The study of kinetic models is then expanded to cover imaging of calcium ions in the cytosol and different organelles as well as ways to follow membrane trafficking at the plasma membrane (e.g. TIRF microscopy) and the imaging of calcium and calcium-binding proteins.

Multi-dimensional microscopy by computational deconvolution is covered in Chapter 9, while applications for cryosectioning, *in situ* hybridisation and immunolabelling by light or electron microscopy are discussed in Chapter 10.

The book closes with a section dedicated to specialised screening applications that are used in the pre-clinical setting of drug discovery, particularly high-throughput assays for siRNA or cDNA library screening to study the effects of agents on gene expression. Every step from the qualification of assay application to the components and properties of the respective screening platforms and the image analysis software as well as the assay development are clearly described. A separate chapter discusses image quantification and analysis parameters, such as densitometry, morphometry, movement and change of intensity manually or automatically, to obtain the most accurate results from your microscopy equipment and software.

This book is an up-to-date guide to the field of microscopy and imaging. It descibes the key methods that can be used in the study of cellular and subcellular components and events as well as the relevant equipment. **Cell Imaging: Methods Express** is relevant to any researcher who wishes to learn about cell imaging and its applications from the very basics of light microscopy to high throughput imaging.

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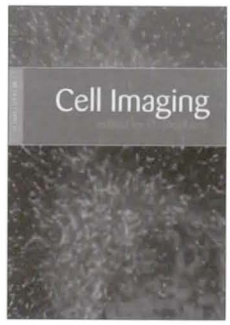

Cell Imaging: Methods Express
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Cell Biology 2nd Edition. 2007

POLLARD TD AND EARNSHAW WC

A process of 'continuous improvement' has been used in the production of Pollard and Earnshaw's **Cell Biology 2nd Edition**. Jennifer Lippincott-Schwartz has joined the author team and has made a very important contribution to the section on Membrane Trafficking.

Many other updates and additions have been made and the publishers have coloured the tops of the pages in a different colour according to section. A 'Studentconsult' web address can be accessed using a dedicated PIN code supplied with each book. Much more than trim has been changed in this second edition

Cell Biology 2nd edition
Pollard T D & Earnshaw WC Saunders/Elsevier
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Protein Degradation

EDITED BY R. JOHN MAYER, AARON J. CIECHANOVER AND MARTIN RECHSTEINER

A few years ago, the Nobel Prize in Chemistry was awarded to Aaron Chiechanover, Avram Hershko and Irwin Rose, for fundamental work on one of the most important cellular systems. The ubiquitin-proteasome system (UPS) participates in a very broad array of normal and pathological cellular processes, and it was recently implicated in neurodegenerative disorders [1], heart conditions [2], cancer [3], and more rare diseases such as the Liddle syndrome, an autosomal dominant form of hypertension [4] in which ubiquitin-mediated degradation of a Na^+ channel plays a central role in pathogenesis. The importance of the UPS as a therapeutic target is underscored by the recent approval of the first drug targeting the proteasome. Bortezomib, approved in 2003 by the FDA and in 2004 by the European Medicines Agency (EMEA) for the treatment of multiple myeloma [5, 6, 7], blocks multi-ubiquitinated protein degradation by inhibiting 26S proteasome activity.

In the midst of exciting new developments in the field, a new series of three volumes, published under the gifted editorial oversight of R. John Mayer, Aaron J. Ciechanover and Martin Rechsteiner, becomes an indispensable resource for a broad range of life scientists. The first volume, **Protein Degradation: Ubiquitin and the Chemistry of Life**, offers a wonderful background about the UPS. Some of its highlights are the insightful discussions on the history and evolutionary origins of ubiquitination; the overviews on ubiquitin ligase structure, function and regulation; the discussions about the 20S and 26S proteasome; and the bioinformatics perspectives. **Protein Degradation: The Ubiquitin-Proteasome System**, the second volume, explores the proteasome, its regulation and diversity, and the mechanisms of protein processing in this pathway. This volume provides an interesting perspective on the molecular details of archaeal proteasomes and bacterial ATP-dependent proteases, and the importance of these systems in providing valuable insights into their eukaryotic counterparts. The third volume, **Protein Degradation: Cell Biology of the Ubiquitin-Proteasome System**, emphasizes the evidence that the UPS plays a role in physiological and some pathophysiological processes, such as peroxisome biogenesis, muscle development and remodelling, the endocytotic pathway and endosomal sorting, cellular hypoxia, cell proliferation and cancer. An interesting chapter in this volume explores the discovery, structure and function of IGS15 and summarizes the findings implicating this protein in viral protein trafficking and in pregnancy. Throughout the volumes, readers will find a plethora of structural biology data, testimony to our recent advances in comprehending three-dimensional structures and in exploring structure–function relationships.

The three volumes represent an excellent resource for a broad audience, including life science students and professionals, in need of a better understanding of the cellular system that was so relevantly called the cells' trash collectors [8]. The text, one of the best reviews available on protein degradation, will particularly benefit microbiologists, molecular biologists, geneticists, physiologists, cell biologists and biochemists.

There are several fundamental lessons emerging from the series. Summarized in the opening remarks by Avram Hershko in the first volume, they extend beyond the proteasome and far beyond any specific topic in any defined scientific area. One, the continued importance of biochemistry in biomedical research, is a fundamental teaching that will help generations of scientists. The other two words of advice, which also evolve from the arduous and elaborate story of ubiquitin discovery, should become crucial teachings for scientists irrespective of their field of study: not to accept authority in science; and, if you believe long enough that you have a biologically important problem to study, you should pursue it, even if very few other researchers are interested in it.

Richard A. Stein *(see page 14)*

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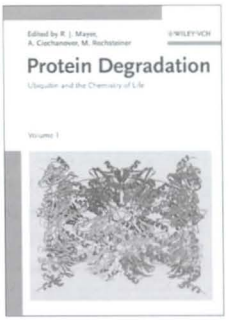

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Wiley-VCH

Books for review

Textbook of in vivo Imaging in Vertebrates Ntziachristos, Leroy-Willig, Tavitian Wiley
Practical Skills in Biomolecular Sciences Third Edition Reed, Holmes, Weyes, Jones Pearson
Decoding the Genomic Control of Immune Reactions Novartis Foundation symposium 281 Wiley
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Proteomics: Methods Express O'Connor, Scion Publishing
A Textbook of Neuroanatomy Patestas and Gartner, Blackwell
Skeletal Development and Remodelling in Health, Disease and Aging Zaidi, Annals of the New York Academy of Sciences

Meeting Reports

BSCB, BSDB and Genetics Society Joint Spring Meeting 2007

29 March – 1 April 2007. Heriot-Watt University, Edinburgh.

> This year's BSCB Spring Meeting was a joint venture not only with the British Society for Developmental Biology but also with the Genetics Society.

The meeting, which took place at the Edinburgh University Heriot-Watt Campus, covered a wide range of topics and attracted 538 participants and 194 posters. The talks were organized into four sets of two parallel sessions, followed by a single concluding session on the Saturday morning (session titles listed below). There were also multiple plenary lectures including the BSCB Hooke Medal Lecture, as well as a Lunchtime Workshop entitled "Setting up your lab", chaired by our president, Clare Isacke.

The report below has been contributed with help from **Silvana van Koningsbruggen** and **Richard Buus** and covers the Hooke Medal Lecture and the three sessions that were arranged by this year's BSCB co-organizers **Angus Lamond** and **Sylvie Urbé**.

Protein Modification
Ubiquitin, Trafficking and Signalling
Nuclear Dynamics
Genomes, Chromosomes & Disease
Cell Growth
Biological Clocks
Genetics of Behaviour
Cell Polarity and Migration
Systems Biology, 'Omics' and High Throughput Screens
Hooke Medal Lecture

Protein Modification

The **Protein Modification** session was chaired by **Ron Hay** (University of Dundee, UK). Ron introduced us to the family of SUMO proteins, which share a similar overall architecture with ubiquitin but have a very different surface. SUMO can be conjugated to proteins in a similar manner to ubiquitin and Ron described how his lab has set out to identify SUMO targets for which the extent of sumoylation is altered upon heat shock treatment of the cells. They employed the Stable Isotope Labelling with Amino acids in Culture (SILAC) technique, which utilizes amino acids incorporating stable isotopes to differentially label three cell populations in vivo in combination with "Tandem Affinity Purification" of sumoylated proteins. Overall sumoylation of proteins was increased in heat shock treated cells and this may be due to inactivation of SUMO-specific proteases (SENP). Ron then discussed progress his lab has made in understanding the mechanism by which one of these proteases, SENP1, interacts with its substrate. This enzyme discriminates between SUMO1, 2 and 3 but only in the context of precursor processing. The key to its mode of action came from the crystal structure, which revealed a dramatic 90°C kink and trans–cis isomerisation induced by the enzyme in the isopeptide bond linking SUMO to the target, which is proposed to be essential for the catalytic process not only of SUMO – but maybe also of Ubiquitin-specific proteases.

SUMO was also at the centre of a short talk by **Wayne Miles** (University of Manchester). Wayne described how Dpp (a TGFß signalling molecule)-induced SUMOylation of the transcription factor Medea defines embryonic dorsal-ventral patterning in *Drosophila*. Medea was shown to be sumoylated at multiple sites and a mutant *Drosophila* defective in the sumoylation pathway showed increased DPP signalling and transcription levels, in line with the key role of sumoylation in transcriptional repression.

Helle Ulrich (Cancer Research UK, London) presented her work on how cells manage to maintain their genetic information in the face of DNA damage and in particular the role of the processivity factor PCNA in DNA damage bypass in *S. cerevisae*. PCNA can either be ubiquitinated or sumoylated and acts as a platform to recruit proteins with binding domains for these ubiquitin-like modifiers to the replication fork. These proteins then determine, which type of DNA damage repair pathway is going to be engaged. Firstly, Helle showed that mono-ubiquitination is a functional modification in its own right and promotes the recruitment of damage tolerant polymerases via both PCNA- and ubiquitin binding motifs. Secondly, she discussed that although PCNA can be sumoylated at the same lysine residue that serves as a ubiquitination site, these two modifiers do not act in an antagonistic way. In the absence of DNA damage during S-Phase, sumoylation of PCNA recruits SRS2 (suppressor of Rad6), which keeps recombination enzymes away. When damage occurs, ubiquitination replaces sumoylation and acts to recruit enzymes that allow damage tolerant repair. How this switch occurs is currently unclear.

James Sullivan (MRC Laboratory of Molecular Biology, Cambridge, UK) gave a short talk about the recruitment of the ubiquitin ligase Rsp5 to membrane proteins, which need to be ubiquitinated for correct sorting to the yeast vacuole. Interaction between Rsp5 and substrates is mediated via PY motifs in the substrate and one or several WW-domains in Rsp5. However some proteins lack a PY motif and rely on adaptors for recruiting the ligase. This is the case for two membrane proteins Cps12 and Tre1, which depend on the adaptor Bsd2 for correct sorting. James' data suggest that some membrane proteins (e.g. Smf1) rely on a complex set of interactions involving multiple adaptors with PY-motifs for recruitment of Rsp5.

The next talk concerned a very different type of modification and was presented by **Pascal Therond** (University of Nice, France). Pascal discussed how lipid modifications affect the activity of Hedgehog (Hh) in *Drosophila* embryos and imaginal disks. Hh is both palmitoylated and, uniquely amongst metazoan proteins, also covalently modified with cholesterol. Pascal used immunostaining to show that there is a correlation between the appearance of Hh in punctate structures on the apical site, its incorporation in multimeric complexes and its ability to spread. His data suggest that cholesterol (but not palmitoyl) modification is required for long-range spreading and signalling, and allows for efficient planar movement in the epithelium thereby avoiding the dilution of the molecule in the extracellular space. Pascal also introduced a genome-wide siRNA screen in Drosophila culture cells, based on the secretion of Renilla fusions of Hh that has already identified a number of genes regulating its secretion.

The last speaker of the morning session, **Jane Mellor** (University of Oxford, UK) described her work on the modifications associated with histones. She discussed how methylation of different lysines plays distinct roles in a complex scenario that ultimately defines the sites of transcriptional activity. She showed that tri-methylation of K4 in the Histone H3 predominantly occurs in the 5'region of genes and suggested that this is one of the key epigenetic determinants that define the region that RNA polymerase will associate with. This tri-methylation promotes increased acetylation of H3 and H4 and thereby loosens the chromatin structure making the DNA more accessible. Di-methylation of another lysine (K36) in contrast, causes deacetylation of chromatin within the transcribed region of the genes as a safeguard against initiation downstream of the actual promoter. She also described the role that 14-3-3 proteins may play in regulating the level of acetylation of K14 in histone H3, which in turn is required for tri-methylation of K4. This pathway is rapamycin sensitive and may serve to transduce growth signals to the chromatin.

Ubiquitin, trafficking and signalling

The afternoon session entitled **Ubiquitin, trafficking and signalling** was chaired by **Sylvie Urbé** (University of Liverpool, UK). Sylvie discussed how ubiquitin can act as a reversible and versatile signal that can be removed by deubiquitinating enzymes (DUBs). She focussed on the role of DUBs in the down-regulation of growth factor receptors. In particular, she discussed the relationship between two DUBs, UBPY and AMSH, which both compete for binding to the endosomal sorting protein STAM. These two enzymes oppose each other's action in regulating the fate of down-regulated EGF receptors. In addition, UBPY but not AMSH depletion had severe effects on the cellular ubiquitination status, endosomal morphology and promoted the proteasomal degradation of STAM. This may indicate that one role of UBPY lies in stabilizing STAM by constantly editing or removing associated K48-linked ubiquitin chains. AMSH preferentially cleaves a different type of chain linkage, linked through K63 and therefore cannot substitute for UBPY. Sylvie also presented data suggesting that UBPY and AMSH may share additional binding sites on endosomes through a conserved N-terminal domain, which is required for UBPY function on the endocytic pathway.

Ivan Dikic (Goethe University, Frankfurt, Germany) gave an excellent overview of ubiquitin and ubiquitin-like modifiers. He discussed what similarities and specificities these systems have in terms of binding domains and how their interaction with a multitude of ubiquitin-fold binding domains can be used to regulate functions as diverse as DNA repair, endocytosis and trafficking of growth factor receptors. With respect to the endocytic pathway, Ivan explained that ubiquitin not only acts as a sorting signal but can also have a regulatory role. In particular, he discussed how mono-ubiqiutination of components of the sorting machinery can promote their auto-inhibition through intramolecular ubiquitin:ubiquitin binding domain interactions. Ivan also reported on work in his lab on a novel mechanism of E3-ligase independent ubiquitination, that seems to be specific to proteins harbouring a ubiquitin binding domain. Finally, he discussed the presence of domains that have a ubiquitin like fold (ubiquitin-fold domains or UFD) in many proteins, including the kinase TBK1, which also may play a role in intra- and intermolecular interactions between components of oligomeric signalling complexes.

Paul Lehner (Cambridge Institute of Medical Research, UK) presented his group's work on the ubiquitination of immunoreceptors. Paul discussed the role of K3, a viral E3 ubiquitin-ligase from Kaposi's Sarcoma-associated herpesvirus (KSV) that targets MHC class I molecules. This immuno-evasion strategy minimises the display of viral particles on the cell surface. Paul described how they dissected this interaction and revealed that sequential ubiquitination is required for receptor internalization and degradation. This is mediated by initial mono-ubiquitination of the substrate by one E2, UBCH5b/c, followed by ubiquitin chain extension by the K63-linkage specific UBC13. Both E2s have to work in conjunction with the K3 E3 ligase and the resulting K63-linked ubiquitin chains are necessary for the downregulation of MHC I. Paul also discussed work on another KSV encoded E3 ligase called K5, which plays a key role in the evasion of Natural Killer cells. Finally, Paul mentioned their work on a family of cellular orthologues of these enzymes, called the MARCH proteins, which share with K3 and K5 the presence of a transmembrane domain.

The remaining talks that afternoon concerned the signalling aspects of ubiquitin modifications. **Karine Enesa** (Imperial College London, UK) presented a short talk on the regulation of NF-kappa B signalling by ubiquitination. Using siRNA silencing and over-expression experiments, she showed that the deubiquitinating enzyme (DUB) Cezanne can suppress pro-inflammatory signalling and that this requires its de-ubiquitinating activity. Another previously characterized DUB, A20, is able to suppress the same pathway, but Karin's data suggests its de-ubiquitinating activity is not essential for this effect.

Candida Nibau (University of Birmingham, UK) gave a short talk on the role of two armadillo/beta-catenin related proteins found in the model plant *Arabidopsis* called Arabidillo-1 and 2. These novel and very unstable proteins are part of multi-subunit SCF-type E3-ubiquitin ligase complexes. Arabidillo proteins contain an F-box, which confers substrate specificity to the SCF-complex. Her work suggests that Arabidillos promote lateral root development by targeting an inhibitor of that process for polyubiquitination and subsequent proteasomal degradation.

And finally **James Chen** (University of Texas, USA) discussed the key role of ubiquitin signalling in NF-kappaB activation. In particular, he explained how K63-linked polyubiquitin chains, established on a single conserved lysine residue in RIP1, act as a scaffold for recruitment and activation of the downstream components of the signalling network, namely the kinases TAK1 and IKK. This recruitment is mediated by the regulatory subunits TAB2 in the case of TAK1, and NEMO in the case of IKK. Both TAB1 and NEMO preferentially bind to K63-linked polyubiquitin chains and these types of chains are formed on RIP1 by the action of the E3-ligase TRAF2 in conjunction with the UBC13/UEV1A E2 complex. Finally, James discussed recent data suggesting that TRAF6 and UBC13 also play a key role in adaptive immunity, whilst a UBC13 independent, but TRAF6-independent mechanism of IKK activation can be demonstrated in some cell types.

Systems biology, 'omics' and high throughput screens: the future?

The final session, entitled **'Systems biology, "omics" and high throughput screens: the future?'** was opened with a plenary lecture by **Matthias Mann** (Max-Planck Institute for Biochemistry, Munich, Germany), who also chaired the session. Matthias gave a broad overview of the latest technological advances from his laboratory, using quantitative, mass spectrometry-based proteomics approaches. This included the proteomic analysis of complex biological materials, including body-fluids from many different organisms, and these data are available on the Max-Planck Unified proteome database (MAPU). In the second half of his talk, he demonstrated how powerful the SILAC (Stable Isotope Labeling of Amino acids in Cell culture) technology is for 'interaction proteomics', including the analysis of modified histones and RNAi based experiments. He also used SILAC to analyse the phospho-proteome and to define in unprecedented detail the cellular response to signalling events. Finally, Matthias described how in future the SILAC approach can be applied to tissues and whole animals *in vivo*, rather than just cultured cell lines, thanks to the development of "SILAC mice".

The second speaker, **Jochen Wittbrodt** (EMBL, Germany) presented his work on vertebrate eye development and the role of Six3 and its interactor geminin in proliferation and differentiation. Jochen described how they identified in vivo binding sites for Six3 using the nano-PET technology, in which they combine ChIP assays and sequencing of fragments cloned into a PET-library. The loci they identified included several different categories of genes, such as transcription factors, cell cycle regulators and the miRNA pathway.

Fiona Wardle (Cambridge University, UK) gave a short talk that focussed on the identification of transcriptional targets of the No tail gene in zebrafish embryos to further understand cell fate decisions during embryogenesis. No tail is a key regulator of mesodermal cell fates. She identified several motifs among which the T-domain binding site, as enriched in target promoters by using chromatin immunoprecipitations, genomic microarrays (ChIP-on-chip) and computational analysis.

Anja Persson (Royal Institute of Technology, Sweden) described a large scale project called the Human Protein Atlas, which aims to generate well characterised antibodies specific for each of the protein products of the human genome. All the antibodies are generated as rabbit polyclonals, raised against recombinant proteins expressed from cloned human cDNAs. A major aim of the Protein Atlas project is to use these antibodies to analyze human tissue samples from many different healthy and cancer tissues and to compare the protein expression results with cognate micro-array data. At present, they have analysed ~1500 genes and these data are described in an online database (www.proteinatlas.org) where the antibodies can also be purchased. Anja concluded by describing the newest features that will be incorporated into the web site, such as expression data clustering, antibody staining of rat-brain tissue sections and in silico biomarker discovery options.

Amer Ahmed Rana (University of Cambridge, UK) presented a short talk describing their high throughput data on genes required for development of *Xenopus Tropicalis*. Some of the advantages of working with this organism were highlighted in the talk, such as their fast rate of development and the fully sequenced diploid genome. They have used an antisense approach to target the knock-down of 202 evolutionary conserved genes using morpholino oligonucleotides. In their analysis of the resulting data, embryos with similar phenotypes were clustered into synphenotypic groups to provide new insights into early vertebrate development.

Next, **Steve Oliver** (University of Manchester, UK) discussed model-driven approaches to deal with the complexity of a 'simple' eukaryotic cell by metabolic control analysis. First, he looked for genes with a high degree of control over flux by identifying those genes that significantly changed growth rate when in the heterozygous state. Second, he used a stoichiometric model of yeast metabolism in order to predict synthetic interactions between genes with a level of success that was two orders of magnitude greater than random.

Finally, the last speaker of the meeting was **Lucas Pelkmans** (ETH Institute of Molecular Systems Biology, Switzerland). Lukas presented his work analysing specific endocytic pathways of virus entry into the cell. A systematic image-based RNAi approach was used to annotate the human kinome, which is defined as a subset of the genome consisting of the protein kinase genes, in different infectious virus entry routes. This method allowed Lukas to classify viruses based on their mechanism of host entry. The resulting information has potential for the future development of drugs that target the host-entry system instead of the virus itself, thereby avoiding anti-viral resistance.

Hooke Medal Lecture

This year's Hooke Medal, was presented to **Tomo Tanaka** (Gene Regulation and Expression Division, University of Dundee) by Claire Isaacs. Tomo's medal lecture, entitled "Kinetochore capture and bi-orientation of the mitotic spindle", amply showed why he was chosen for this prestigious award. Using an innovative combination of advanced, time-lapse fluorescence imaging and yeast genetics, Tomo and his coworkers have made seminal contributions to characterizing the molecular mechanisms involved in ensuring that chromosomes are properly segregated when cells divide. In particular, Tomo's work has shed light on the previously mysterious process whereby kinetochores are initially captured by spindle microtubules.

During mitosis it is essential for each daughter cell to receive a complete set of chromosomes. At metaphase, the replicated chromosome pairs are aligned and the spindle apparatus forms attachments with kinetochores, which are large multi-protein complexes assembled at the centromeres. To prevent mis-segregation of chromosomes, anaphase must not commence until bi-orientiation is established, i.e., when the sister chromosomes on the metaphase plate have their respective kinetochores attached to microtubules from spindles at opposite poles. Tomo's work has shown that it is the formation of tension between sister chromatids attached to opposing spindles that is the key determinant used by cells to determine that bi-orientation has been correctly established. Tomo has further demonstrated that Aurora B kinase, called Ipl1 in yeast, has a crucial role in this process.

Tomo has succeeded in visualizing the interactions between individual kinetochores and microtubules using time-lapse fluorescence microscopy. This revealed that kinetochores are captured by the side of microtubules extending from spindle poles and subsequently transported polewards along the captured microtubule. Extension of microtubules from spindle poles depends upon microtubule plus-end-tracking proteins and the Ran GDP/GTP exchange factor. Tomo has shown that Kar3, a member of the kinesin-14 family, is an important regulator involved in promoting transport of captured kinetochores along microtubules. Furthermore, he could show that kinetochores are able to avoid sliding off the attached microtubules by facilitating the conversion of microtubule dynamics from shrinkage to growth at the plus ends, mediated by transport of Stu2 from the captured kinetochores to the plus ends of microtubules. Kinetochore sliding is found to be converted often to end-on pulling, but not vice-versa. Tomo has suggested that the Dam1 complex, which likely encircles a single microtubule, converts microtubule depolymerization into the poleward kinetochore-pulling force. These important discoveries, made possible through elegant and technically demanding experiments, have greatly expanded the molecular description of the mechanisms underlying the control of chromosome segregation.

Details of the Spring 2008 Joint Meeting of the British Societies for Cell and Development Biology can be found on page 46.

Dynamic organisation of nuclear function – Cold Spring Harbor Symposium

27 September – 1 October 2006. Cold Spring Harbor Laboratory, USA

At the fifth meeting on dynamic organisation of nuclear function, 235 abstracts were presented, divided into 72 talks and 163 posters. The talks were short, at only 15 minutes, allowing several speakers to present their work, including many post-docs and graduate students. Also, there was only one session in progress at any time, meaning there was no dilemma about which talks one had to miss.

My first ever transatlantic flight got me to CSHL a day early, allowing me to recover from my jetlag in our on-campus accommodation; the wooden 'Eagle cabin'. We were even able to fit in a brief visit to Manhattan which is only about an hour away on the Long Island Railroad. Although the talks continued late into the evenings, the meeting was punctuated with long breaks in which people could meet and discuss their work over tea, food or a drink in the on-site bar. We were lucky enough to have sunny weather meaning that barbeques formed some of the lunches, where delegates could sit out on the grass and overlook the lake. CSHL students also provided guided tours of the beautiful campus, including amazing tales of the laboratory's past, such as grass being grown indoors for sheep in the early days.

The first session of talks on the first evening was entitled '**chromosome organisation and DNA replication**', which was kicked off by **David Gilbert** (Florida State University, USA), who described his lab's work investigating the link between chromatin higher order structure and replication timing in a *Xenopus* system. They found that cells lacking the Suv39h1,2 methyltransferases, which methylate histone H3 at lysine 9, replicated chromocenter (peri-centric heterochromatin clusters) DNA more rapidly than wildtype cells, indicating that Suv39 activity is required for 'fine tuning' of peri-centric heterochromatin replication compared to other late-replicating domains.

The second session started the next morning, following a hearty American breakfast, and covered '**nuclear bodies**'. In this session **Peter Hemmerich** (Leibnitz Institute for Age Research, Germany) discussed his lab's results indicating that, contrary to the indications of previous work, PML nuclear bodies are not sites of DNA damage repair as indicated by confocal microscopy comparing the localisation of H2AX foci and PML nuclear bodies following DNA damage.

The first of two poster sessions followed, which included my own poster, making this my first ever international presentation. This session included a poster by **Laurence Denis** from **David Spector's** lab (CSHL, USA), which examined the establishment of epigenetic marks during S phase, suggesting that newly incorporated histones H3 are methylated on lysine 9 by virtue of the localisation of methylases to the replication foci.

Another example was a poster presented by **Bernike Kalverda** of the **Fornerod** lab (Netherlands Cancer Institute, Netherlands). This covered a study using DamID to identify the points of contacts between nucleoporins and the genome in *Drosophila*; finding that different nucleoporins targeted similar genes which were characterised by transcriptional activity.

This session was followed by a wine and cheese party in the grounds of the Airslie building. Later that evening was the '**RNA processing and export**' session of talks, including one from **Michel Bellini** (University of Illinois, USA). This presentation described work investigating the recruitment of snRNPs to active transcriptional units, which found that splicing itself is not required for their recruitment to nascent mRNA chains.

The '**nuclear structure and disease**' session was on Friday morning, and primarily concentrated on laminopathies. Of particular interest to the non-expert such as me was an overview of nuclear lamins in human disease, provided by **Robert Goldman** (Northwestern University, USA) and a presentation by **Naomi Willis** from the **Hutchison** Lab (University of Durham), describing the identification of lamin A/C as a marker for death in colorectal cancer.

This was followed by the second poster session, including a poster by **Gayle Pageau** from the **Lawrence** lab (University of Massachusetts, USA), which described the finding that BRCA1 localises preferentially to peri-centric heterochromatin in a manner which may suggest a role for BRCA1 in replication of the repeat regions of centromeric DNA.

The '**chromosomes and the cell cycle**' session took place that evening. This included a presentation by **Bill Earnshaw** (University of Edinburgh), describing evidence that an as yet unidentified 'regulator of chromatin architecture' drives and maintains chromatin condensation during mitosis, and is targeted and inactivated by PP1 and the PP1 targeting subunit Repo-man during anaphase in chicken cells.

On Saturday morning was a session entitled '**emerging technologies to access nuclear organisation**', which was no doubt of great interest to all delegates. This included a talk by **Jan Ellenberg** (EMBL, Germany); describing the use of 4D confocal microscopy to discover that maximal compaction of chromosomes occurs by axial shortening in anaphase, in a manner dependent on Aurora kinase activity. A talk by **Daniel Anderson** from the **Hetzer** lab (Salk Institute, USA) described a novel imaging assay for nuclear envelope assembly. This involved immobilisation of DNA on glass, and reconstitution of chromatin on this DNA using Xenopus egg extracts. Assembly of nuclear envelope from these extracts on the immobilised chromatin spot could then be observed by confocal microscopy. **Laura Trinkle-Mulcahy** from the **Lamond** lab (University of Dundee),

described the use of the SILAC (stable isotope labelling of amino acids in cell culture) method in quantitative proteomic mapping of nuclear complexes in mammalian cells stably expressing GFP-tagged proteins, which they recently used to identify Repo-man.

The afternoon session discussed '**the nuclear periphery**'. In this session **Megan King** from the **Blobel** lab (Rockefeller University, USA), described the findings that nuclear import of inner nuclear membrane proteins proceeds in a karyopherin-dependent manner similar to classical nuclear import. The inner nuclear membrane proteins contain basic nuclear localisation signal-like motifs which can interact with karyopherin ?.

In the evening there was a concert by Wonny Song on the piano, followed by generously proportioned cocktails, then the traditional lobster banquet. Later there was a disco, where principal investigators and students alike let their hair down and danced like nobody was watching!

The speakers in the final session of the meeting drew the short straw, as the transcription and genome function session began at 9 am the next day. This included a talk by **Jennifer Mitchell** form the **Fraser** lab (Babraham Institute), describing data that indicate that transcription factories exist in the absence of transcription and are thus do not only form on active genes, but exist as independent sub-nuclear components.

Overall the meeting provided a great insight into both global concepts and specific pathways in nuclear organisation and function, in a friendly environment, and leaving a lasting impression. I would like to thank the BSCB for granting me an Honor Fell travel award to help cover the costs of attending.

Fiona Hood, Biomedical Research Centre, Ninewells Hospital & Medical School, Dundee

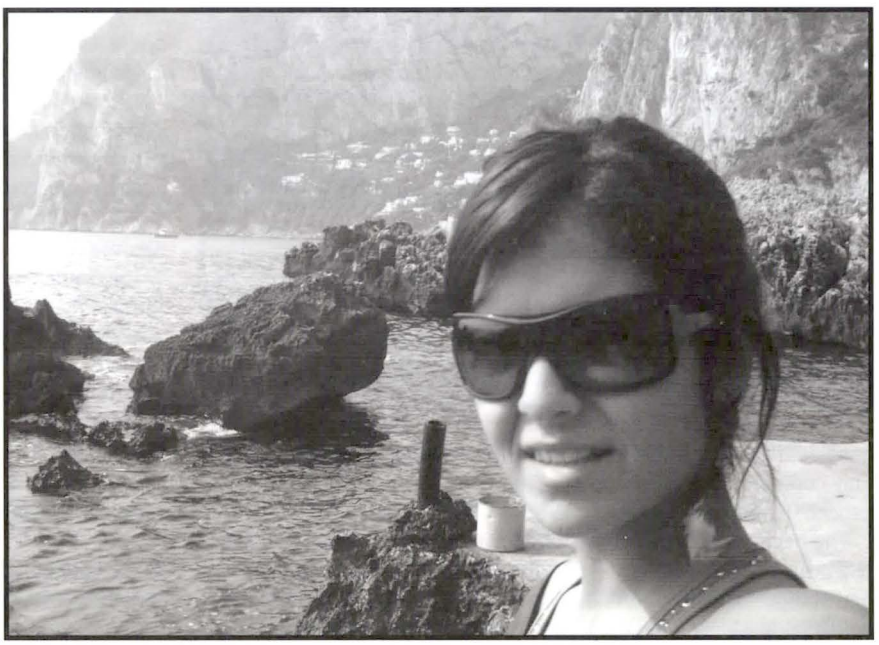
EMBO Workshop on Cell Migration, Tissue Invasion and Disease

14– 17 October 2006. Capri, Italy

Only the joint financial support from a BSCB Honour Fell Travel Award and from a British Society for Developmental Biology (BSDB) Travel Grant, together with two other sponsors, gave me the wonderful opportunity to attend this amazing meeting. It was very exciting to meet so many great scientists, and to learn so much from them, specially being a first year PhD student, thirsting for knowledge.

It was from the ferry that we had the first sight of Capri. This splendid island would be our home for the next 4 days, which were filled with science and knowledge in surrounding of such natural beauty.

More than 80 researchers from all over the world got together to discuss the latest breakthroughs in this field, and each session was extremely well organised. This was also possible due to the informal environment possible due to the small number of participants. In addition, the poster sessions brought about pleasant breaks to share opinions and debate ideas, as well as receiving insights and feedback on your work.



The conference set off with a **Richard Assoian** (University of Pennsylvania) talk on the correlation between proliferation, adhesion and migration, specifically during epithelial-mesenchymal transition (EMT). He gave a detailed description on several signalling pathways that act as tensional sensors, inducing cyclin D1 as a consequence of actin cytoskeleton remodelling and Mitogen-Activated

Protein Kinase (MAPK) activation in EMT.

Also of interest during the Cellular and Molecular Mechanisms session, was the short talk by **Gareth Jones** (Kings College London). He gave insights into Wiskott-Aldrich Syndrome Protein (WASP) recruitment and stabilisation, in podosomes of migrating dendritic cells, by WIP (WASP-Interacting Protein). He went on with an explanation on WIP's role on the formation of actin cores containing WASP and on the organisation of integrin in circular arrays, particular features of podosome architecture and resulting motility.

Further on, **Stefano Alema** (Consiglio Nazionale delle Ricerche, Italy) described briefly the way in which p120 and Eps8 are partners. Eps8 is, therefore, recruited to cell contacts in a cadherin/p120 dependent manner to regulate the growth of actin filaments, essential for motility, by capping its ends. In addition, Eps8 silencing retards formation of adherens junctions upon calcium shift, inhibiting wound healing, decreasing Ecadherin levels and increasing cell motility.

David Salomon (National Cancer Institute, NIH) in his turn, discussed the way Cripto-1 (Nodal co-receptor) signalling through Src (Sarcoma) and phosphatidylinositol 3-kinase (PI3K) induces migration, invasion and EMT in breast cancer cells, forming tumours in mammary epithelial cells. Also, he showed that Netrin-1 might play a crucial role in maintaining mammary epithelial cell polarity by inducing a mesenchymal to epithelial transition (MET). As a result, it reversed Cripto-1 effects on EMT, blocking migration and invasion in his *in vitro* system.

Elisabetta Dejana (IFOM, FIRC Institute of Molecular Oncology, Italy) explained that in mouse embryos, the normal vascular development was inhibited when genes coding for vascular endothelial (VE)-cadherin and ?-catenin (adherens junctions proteins) were inactivated. In particular, the ones without VE-cadherin showed a more dramatic phenotype that the ones lacking ?-catenin. This happens not only because the former has Vascular-Endothelial Growth Factor (VEGF) signalling disrupted, but also because it may possibly interact with independent pathways or have distinct additional functions from the latter.

After a healthy and delicious lunch, the evening session, dedicated to **Migration in Development**, opened with **Paola Bovolenta's** (Instituto Cajal, Spain) talk on how Secreted Frizzled Related Protein 1 (SFRP1) is involved in specification of the vertebrate eye field, neurogenesis in the retina and its elongation, independently of its interaction with Wnts. As she described, in her model organisms, chick and medaka fish, it does so by being expressed at "choice points" of the embryonic visual pathway, possibly interfering with the cytoskeleton organization of the growing axon.

There was also another exceptionally good short talk in the afternoon. **Dulce Azevedo** (Instituto de Medicina Molecular, Portugal) gave an explanation on how cell invagination during tissue morphogenesis is directed by compartmentalisation of Rho (Ras homologous) regulators. She demonstrated that Rho1 GTPase (guanosine tri-phosphatase) activity is apically restricted during epithelial invagination. Moreover, in the fly embryo, in particular in the posterior spiracles, Rho inhibitors and activators are activated in opposite compartments of the cell membrane to control specific cell shape changes and movements that give rise to this fly organ.

But for me, the most inspiring talk of the day was **Denise Montell's** (John Hopkins School of Medicine, USA) one. She presented us with some pretty impressive time-lapse movies of border cell migration, in living culture of *Drosophila melanogaster* ovaries. Live imaging is the technique she uses to study *in vivo* what controls the ability of epithelial cells to become invasive. Some of the candidate genes that are being identified from ongoing screens, not only control border cell migration, but they also contribute to ovarian cancer.

The beginning of the second day was even more exciting. **Angela Nieto** (Instituto de Neurociencias de Alicante) was the first speaker and she put the accent on how Snail regulates cell movement and epithelial plasticity and so, induces EMT either in development or pathological situations. Her studies in zebrafish by loss and gain of function analysis were very useful to understand that *snail1b* was of extreme importance for the coordinated migration of the axial mesendoderm cells, which have pretty little adhesion. Regarding plasticity, she talked about the way Snail induces EMT in non transformed cells, disrupting tissues homeostasis and causing fibrosis in adult epithelia such as the kidney. But in contrast, she explained how Snail induces dedifferentiation and metastasis in tumours,

Also in the morning session I would like to point out the short talk by **Isabel Campos** (Instituto de Medicina Molecular, Portugal). She stressed on the simple and robust wound healing assay developed to screen for genes that affect *Drosophila* embryonic or larval wound closure.

As in the previous day, the afternoon session started right after the poster session, and after lunch. This time we would be talking about **Migration and Disease**. The first speaker to introduce the theme was **Dylan Edwards** (University of East Anglia, UK), who was there to discuss metalloproteases and cancer. It was very fascinating to learn that it is a very naïve way of thinking to believe that matrix metalloproteinases (MMPs) are mostly pro-metastatic by degrading extracellular matrix (ECM) and basement membrane. In fact, they act in a much more complex way and may even counter steps in tumourigenesis, which explains the inefficiency of some drugs used in cancer treatments and that are MMPs' inhibitors. He calls for the sorting out of what is the input of each of the components of the "degradome" as he calls it to the proteases, substrates and inhibitors involved in malignant tumours. From his studies, new diagnostic markers and therapeutic agents can possibly arise.

But **Eric Sahai's** (Cancer Research UK) presentation based on *in vivo* imaging of primary tumours was also exceptional. He showed that metastatic cancer cells are, in fact, non-motile. What happens is that a small portion of cells transiently switch to a motile phenotype with a non-epithelial morphology. This *in vivo* amoeboid cell motility is Rock dependent. Rock is therefore required for collagen deformation by the generation of a hyperstatic force through acto-myosin organisation. This way, the cell body is pulled, leading to cell motility independently of MMPs activity.

The last sessions were on **Tissue Engineering**, a very ending edge subject. Here I learnt a lot about the guidance of cell migration by modulation of distinct substrate biochemical and mechanical properties (**Paolo A. Netti**, Università degli Studi di Napoli Frederico II, Italy), growth of aligned cardiovascular tissues and nerve regeneration (**Robert Tranquillo**, University of Minnesota, USA), the potential of human embryonic stem cells (hESCs) to differentiate into cardiomyocites (**Christine Mummery**, Institute of the Netherlands), as well as how to attain a better repairing of dystrophic skeletal muscle by improving the migratory ability of mesoangioblasts through cytokines (**Giulio Cossu**, Institute of Cell Biology and Tissue Engineering, Italy).

The meeting ended up with some unexpected but still extremely helpful and amusing presentations on how to prepare a manuscript for it to have more impact, emphasizing common avoidable errors when submitting it; what does an editor of a journal do and how to use the Cell Migration Gateway, a very useful tool. In my opinion, it was the perfect ending for this exceptionally good workshop.

The overall experience was extremely enriching, inspiring, and stimulating. It allowed me to extend my knowledge in the area, get acquainted with the most recent scientific advances and techniques in the field and gave me the opportunity to discuss my work with experts. I do believe that attendance to this unique event committed to scientific excellence undoubtedly provided me with very useful tools to use in my current research project.

Once again, my thanks go to BSCB whose financial support made it possible for me to attend this brilliant meeting.

Joana Caldeira Fernandes, Centro Andaluz de Biologia del Desarrollo, Seville, Spain.

46th Annual Meeting of the America Society for Cell Biology

9–13 December 2006. San Diego, USA

The 46th Annual Meeting of the America Society for Cell Biology was held this year in the San Diego Convention Centre, California, and I was lucky enough to attend this meeting as the winner of the BSCB Young Cell Biologist of the Year award.

I arrived in San Diego the night before the conference started, and on the first day I tried to get acquainted with the huge size of the convention building and to find my way around it. This being my first big international meeting, I was amazed with the size of the conference centre, especially the massive exhibitor's hall. Having so much to do, it was impossible to attend every talk. Beforehand I had highlighted quite a few talks that were of most relevance to the work of my group, and with my conference book and a notepad under my arm I ventured into the meeting.

The opening talk, "**Frontiers in Cell Biology**", was presented by **Bruce Alberts**, the former president of the National Academy of Sciences, and **Thomas Cech**, the winner of the Nobel Prize for Chemistry in 1989. It was inspiring to hear that the different fields of science are now, and will be even more in the future, working together to achieve higher goals. Science disciplines were compared to brick-enclosed rooms, in which the walls were now being removed opening pathways for discussion. It is an encouragement for a young scientist like me to hear that Science is moving forwards, and that in the future we will be able to work together with very different people with different skills, but towards the same goal. The first day finished off with the Opening Night Reception where everybody had the chance to relax and share ideas about the conference.

On Sunday, the second day of the meeting, there were some interesting tutorials I wanted to attend. My research interests are in the field of stem cell biology, mainly isolation, characterisation and study of gene function in Mesenchymal Stem Cells (MSCs), and as such the tutorial entitled "Methods for Isolation, Culture and Analysis of Stem Cells" by BD Biosciences was somewhat obligatory for me. These tutorials were quite good to get to know the new and exciting equipment we can use nowadays to make our lives easier and our research more efficient. Unfortunately they were not very detailed on scientific explanations.

On Monday afternoon there were two minisymposia I wanted to go to, so I split the afternoon into the "**Cancer Mechanisms**" and "**Cell Cycle**" symposiums. I have selected one talk from each topic to describe briefly. The talk by **Linne-Marie Postovit** (Northwestern University, Chicago) highlighted the importance of Nodal, a potent embryonic morphogen, in tumour aggressiveness and the potential role of this molecule in the metastatic potential of melanoma and breast cancer. The talk by **Jonathan Pines** (University of Cambridge, UK) was on the regulation of the cell cycle by Cdks. His lab has developed a system that monitors fluorescence through mitosis, using it as a real time assay for proteolysis to examine how proteins are selected for degradation at specific times. Monday was also the

day I presented my poster, with the title "**Involvement of Myb transcription factors in the function of MSCs**". It was a great opportunity for me to present my work, and to discuss new ideas that will help me be more successful in my PhD.

Between the talks and at lunch time, I had time to talk to poster presenters and check the exhibitor's benches. In particular the posters that were more relevant to my group's work were located in

the Stem Cell area. I will also give a quick description of the ones that caught my attention. The poster presented by **Hyung Im Choi** (University of Ulsan, Korea) was on the NF-κB and PI3kinase/Akt-dependent pathways in murine Haemopoietic Stem Cells (HSCs). She was using dominant negative forms of IκB and Akt to block these pathways, and to study what effects they had on HSCs. When both these signalling pathways were blocked, the expression of the transcription factor c-Myb was suppressed coincident with an up-regulation in the expression of GATA-1. The poster by **Yashoda Sharma** (The Jackson Laboratory, Bar Harbor, ME) presented his work on the mouse Kit oncogene, wherein a mutation in the gene's promoter led to an increase of HSC function. In detail, short-term HSCs showed a higher self-renewal ability and his data on transplantation assays also indicated that the mutation conferred an advantage so that HSCs could repopulate bone marrow in irradiated animals better than the wild-type counterparts.

On Tuesday I was invited by the ASCB to the President's reception dinner. It was a great honour for me to be present at this social event. When I arrived I realised that there weren't as many people at this gathering as I was expecting. Having, after two and a half years living in the UK, adopted some British habits I arrived 5 minutes early and thought it would probably be best to have a walk around before entering the room. The dinner was held at the Mariott Hotel with a fantastic view over the marina. I felt slightly uneasy at first, not knowing anybody, but had later a great conversation about the beauty of Britain with Christopher Turner (Suny Upstate Medical University, New York) who was a co-chair at the ECM and Cell Signaling minisymposium, which I unfortunately missed, in favour of the Cell Cycle and Cancer Mechanisms talks.

Finally Wednesday came, the last day, and the one I had been most looking forward to. Symposium VII was entitled "**Stem Cell Biology**", and was presented by George Daley (Harvard Medical School), Elaine Fuchs (The Rockefeller University, New York), and Margaret Fuller (Stanford University School of Medicine). The symposium began with **George Daley** presenting his ideas on the use of parthenogenesis to create homozygous diploid Embryonic Stem (ES) cells, as a better method than the most commonly used nuclear transfer, to overcome the immune barrier to cell transplants. **Elaine Fuchs** went on to talk about skin stem cells and their interactions in the niche. She underlined the importance of the microenvironment in the maintenance of the stem cell pool, focusing on the signalling pathways involved in keeping the stem cell quiescent, and also on the niche's role in stem cell activation and differentiation. The last talk of the morning presented by **Margaret Fuller** was concerned with the control of stem cell fate by oriented mitotic division. Margaret described the asymmetric outcome of stem cell divisions in the *Drosophila* male germ line, and described how this was determined by the orientation of the mitotic spindle perpendicular to the junctional complex that attaches the stem cell to the niche. She ended the talk by explaining how the cell that divided away from the niche was different from the other, and that this was due to the latter inheriting the adherens junctions that enable it to retain its contact with the niche.

On Wednesday afternoon I attended the last minisymposium on stem cells. The most impressive and fascinating talk for me was presented by **Jennifer Gillete** from the University of Southern California, Los Angeles. She showed her data on the events occuring during the interaction between HSC and osteoblasts, cells that are thought to be a major component of the bone marrow niche. She used quantum dots to label the HSC, and found that after co-culture of these cells with osteoblasts some molecules were transferred from the HSC into the osteoblasts by endocytosis. The conference concluded for me then with this brilliant and inspiring talk, but there was still a little time to have a last peek at the posters for that day.

A couple more days in San Diego allowed me to have some time to explore the city. I most enjoyed riding a bike to the beach and seeing the beautiful Pacific Ocean for the first time, and visiting Sea World, where I had great fun; especially after getting completely soaked during the Killer Wales' show.

I would like to thank the BSCB for this great opportunity that allowed me to attend and present my work at the ASCB meeting in San Diego.

Ana Camelo, Department of Immunity and Infection, Medical School, University of Birmingham. Asc469@bham.ac.uk

San Diego provided some welcome winter sunshine as the venue for the 46th Annual Meeting of the American Society for Cell Biology. With the aid of a BSCB Honor Fell Travel Award I was able to experience this excellent conference in the company of some of my lab colleagues.

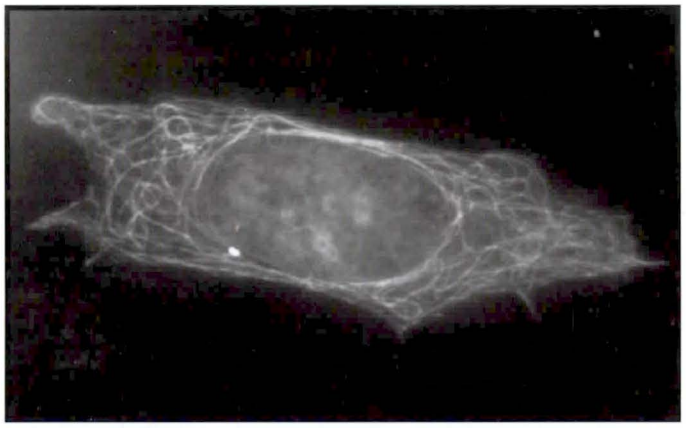
Planning what to see and do at the conference started a couple of weeks ahead of the meeting with the arrival of the program and electronic abstract guide. Due to the enormity of the meeting this was essential to be able to plan an itinerary to appreciate everything of interest.

After 24 hours travelling, the first day of the meeting was relatively relaxed, starting with lunch in the format of a round-table discussion to identify the needs of international members of the ASCB. The afternoon was filled with talks from member-organised special interest subgroups covering a wide range of cell biology areas. With my own research interest broadly covering the centrosome, cilia and cell cycle control, I headed to talks in the sessions entitled '**Building the Cell**' and '**Intraflagellar Transport**'. For a meeting principally based on the poster sessions these subgroups provided accessible quick snapshots of research from a range of groups.

The meeting officially opened in the evening with the keynote symposium entitled '**Frontiers in Cell Biology**'. **Thomas Cech** (Howard Hughes Medical Institute) discussed 'Science without Borders', whilst **Bruce Alberts** (University of California) presented 'Some Major Challenges for Scientists and for Universities'.

The meeting really got going on the Sunday with the first poster session. In an aircraft hanger sized hall, over 700 posters, that changed each day, were interspersed with exhibitor stands. This provided a good balance of being able to engage in discussion with poster authors and to find out about the latest technologies available.

It was in this session that I presented my poster on centrosome duplication. I was greatly encouraged by the level of interest shown and was appreciative of the opportunity to discuss my work with scientists working both on closely related topics and those with a less direct interest. After the session I was left with some excellent



feedback and suggestions, along with offers of reagents.

The first round of minisymposia got underway in the afternoon. The presentation of centrosome related talks in a variety of sessions reflected the range of processes the centrosome is implicated in during the cell cycle. Whilst this is fantastic for those working in this fascinating field it did provide a planning headache and quick dashes between different sessions. Of particular note was the talk presented by **Jin-Wu Tsai** (Columbia University, NY) in the **'Cell Migration'** session. Here he detailed the use of triple labelling in live brain tissue to observe the centrosomal, nuclear and microtubule behaviour in migrating neural progenitor cells. Combining RNAi with this imaging system allowed the assignment of dynein and LIS1 to the behaviour of each component and resulted in some impressive movies.

Monday started early with the **'Mechanisms in Mitosis'** symposium. The highlight of this session was the talk of **Ron Vale** (University of California) entitled 'Mining the Genome for Mitotic Treasures'. This work described a whole genome RNAi screen in *Drosophilia* S2 cells to identify genes involved in metaphase spindle formation, resulting in the assignment of 69 novel or unexpected genes. Following this up with GFP-tagging and time-lapse analyse he described 4 novel proteins that recruit γ-tubulin to spindle microtubules and help to build the spindle.

At lunch, I attended a round-table careers discussion. Tables were arranged according to topic, with the most popular by far being **'How to Obtain a Post-doctoral Position'**. This provided an excellent opportunity to meet others at the same point in their careers and discuss experiences and ambitions.

In the afternoon, there was a whole minisymposium dedicated to the cell cycle. In this session, talks included those presented by **Ulf Peters** (Rockefeller University, NY) describing the regulation of spindle assembly by polo-like kinases as examined using chemical inhibitors, and **Jon Pines** (University of Cambridge) summarising work on cell cycle regulation by cyclin-cdks and proteolysis. In the latter, a nice FRET biosensor was described which allowed the direct visualisation of cyclinB-cdk activity in living cells. CFP and YFP are separated by a phosphorylation site and a phospho-protein binding domain. When the site becomes phophorylated, the binding domain can interact, bringing CFP and YFP into close enough proximity for FRET to occur. The signal can then be monitored throughout the cell cycle to observe when and where activation occurs.

Tuesday was a little less hectic with time to appreciate the exhibitor stalls and, with a particular interest in microscopy, I found time to check out the latest in fancy imaging techniques. The **'Kinetochores and Centrosomes'** minisymposium was in the afternoon. The three centrosome talks in this session all concentrated on centriole structure and assembly. The first, presented by **Karen Oegema** (University of California, La Jolla), described *in vivo* imaging in *C. elegans* embryos to define centriole assembly, placing SAS-6 and SAS-4 in order of recruitment to the centrosome. The second talk, by **Petr Strnad** (ISREC, Switzerland), concentrated on human SAS-6 and its requirement for daughter centriole formation. The final talk, by **Juliette Azimzaden** (Institute Curie, Paris), described studies on human POC5, a centrin interacting protein that colocalises to the older centriole throughout the cell cycle, being recruited to new centrioles in G2. Each of these talks was highly relevant to my research and certainly gave me something to think about.

Whilst there was always something to see at the conference, especially with the posters being on display from 7:30 am to 11:00 pm each day, there was still time to appreciate the laid back atmosphere of San Diego. We were lucky enough to be staying in a very nice, albeit expensive, hotel right next door to the conference centre so everything was in walking distance. Each evening provided the opportunity to pick from a range of restaurants, catering for most tastes. The staple diet in San Diego relies on the local excellent seafood and there is a strong Mexican influence with the border only a few miles away. On the final day of the meeting we headed in to the city centre to indulge in some Christmas shopping and to find a present for the lab members back home. The last poster session was virtually deserted, but meant I could catch up with some of those people that had visited my poster.

Overall, this was a highly enjoyable and informative meeting. I am grateful of the opportunity to present a poster to a wider audience and experience such a large conference. I would like to thank the BSCB for the Honor Fell Travel Award which contributed towards my expenses.

Suzy Prosser, University of Leicester

{ The ASCB meeting attracted about 10,000 scientists from all over the world and thanks to the BSCB Honor Fell Travel Award I was one of them. }

I arrived in San Diego in the evening before the meeting started so I had a chance to relax after the long flight from London before the meeting took off.

After looking around in the massive convention centre on Saturday morning, the meeting started for me with a lunch and roundtable discussion that I had been invited to by the Council of the ASCB and the International Affairs Committee. During this roundtable discussion 100 randomly-selected ASCB members were discussing how the ASCB can serve the needs of its international members better. I was lucky to sit at a table with the then current president of the ASCB **Mary C. Beckerle** who led the discussion. It was a very interesting and vital discussion between the delegates at my table. The discussion was closed by bringing all the ideas together and a short discussion which ideas are realisable.

The opening night keynote symposium was entitled '**Frontiers in Cell Biology**' and included talks by **T.R. Cech** (Howard Hughes Medical Institute, USA), who spoke about 'Science without Borders' and **B. Alberts** (University of California, USA), who spoke about challenges for scientists and universities. Following the well attended keynote symposium was the opening night reception held in the Sails Pavilion, the convention centre's central hallway. The hallway's roof consists of distinctive Teflon-coated fibreglass "sails" intended to reflect San Diego's maritime history, as well as to advertise the centre's proximity to the San Diego shore.

The Sunday morning session started with the '**Coordination of Adhesion and Migration**' symposium, which was opened by **D. J. Montell** (John Hopkins School of Medicine, USA) talking about *in vivo* interactions between migrating cells and the microenvironment. The session was closed by a very interesting talk by **Kenneth Yamada** (National Institute of Dental & Craniofacial Research, USA) who spoke about how myosin II and tubulin interact with each other to promote tubulin dynamics in 3D matrices.

I spend the time until the afternoon sessions looking at posters. The number of posters per session is overwhelming, so I was very happy that I had used the 'Online Program Planer' from the ASCB website to create a programme for myself. My research is concerned with the role of reactive oxygen species in leukocyte transendothelial migration and there were a lot of interesting posters in the Sunday session.

In the afternoon I first attended a series of talks entitled '**Immune Cell Adhesion and Recognition**'. **W. Swat** (Washington University School of Medicine, USA) gave a very interesting talk about how Vav might activate Rac2 downstream of integrins, which in turn activates the NADPH oxidase. Halfway through the minisymposium I switched to the '**Migration**' symposium and arrived just in time to hear a presentation by **T. Jeon** (University of California, USA) about how Rap1 mediates cell adhesion in *Dictyostelium* by regulating myosin II assembly.

Monday morning I spend looking at posters; again, it was the most interesting session for me, and there were even more interesting posters than on Sunday. Monday was also the day of my poster presentation, which was well attended. I got some good feedback on my data and could take home some new ideas on how to proceed with my project.

The afternoon brought lots of interesting minisymposia and I had to change rooms to be able to attend all the talks I had picked out. The first talk that I attended was part of the '**Regulation of the Cytoskeleton**' series; **J.E. Bear** (University of North Carolina, USA) was talking about how coronin 1B coordinates Arp2/3 and cofilin activity at the leading edge. The '**ECM and Cell Signalling**' minisymposium had an interesting talk by **M. Nuth** (University of Pennsylvania, USA), who talked about how the matrix stiffness enhances rac-dependent invasion by inducing reactive oxygen species production.

The social event was held on Monday evening in the San Diego Museum of Art. The ticket to this well attended event gave access not only to the provided buffet and disco but also to the exhibition of the museum.

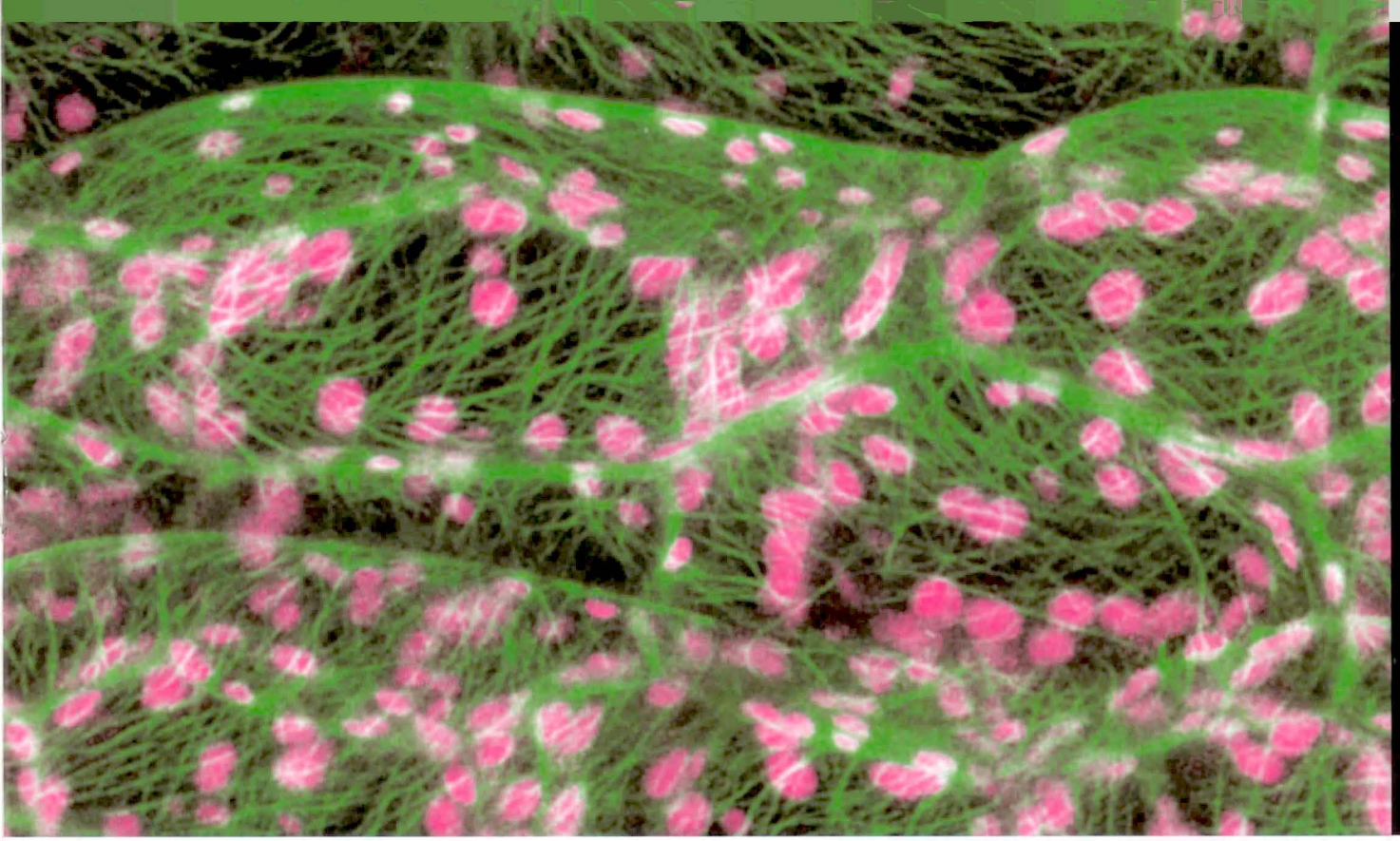
Tuesday brought another set of exciting posters and minisymposia. I attended talks in the '**Application of Biosensors**' series, where **Alice Ting** (MIT, USA) gave a very fascinating presentation about the use of quantum dots in protein labelling. She explained how these 20-25 nm sized dots can be used to do site-specific protein labelling in a very fast and sensitive manner. Afterwards **Y. Sawada** (Columbia University, USA) gave a very interesting and entertaining talk about p130CAS as a direct mechano-sensor. He demonstrated that extended p130CAS shows an enhanced phosphorylation by Src family kinases using a specific antibody that recognises only extended p130CAS and a stretching device that included condoms.

The last day of the meeting started with a symposium about '**Stem Cell Biology**', which included a very interesting talk by **E. Fuchs** (Rockefeller University/HHMI, USA) about stem cells and their lineages in the skin. There were more posters to look at and also I finally found some time to talk to the representatives of various companies about products that I was interested in. In the afternoon I attended the minisymposium entitled '**Imaging**'; one of its highlights was a talk by **E. Betzig** (Howard Hughes Medical Institute, USA) about PALM (photoactivated localization microscopy), which has a near molecular resolution of intracellular fluorescent proteins. Unfortunately this fascinating technique can only be used for TIRF (total internal reflection) microscopy and only for highly expressed proteins.

After the meeting was finished I stayed in California for another week to visit the Mojave Desert and to rent a car and drive up Highway number 1 to San Francisco. In San Francisco I did some sightseeing and rounded my trip up by some Christmas shopping to fly back in time for the Christmas Holidays.

I would like to thank the BSCB for giving me the Honor Fell Travel Award and making it possible for me to attend this highly enjoyable conference.

Jana Gruenewald, Ludwig Institute for Cancer Research, Royal Free and University College School of Medicine, London.



Using colour in figures: some colours are more equal than others

A picture can paint a thousand words, and cell biologists are among those who tend to put a high value on pictorial representations. With the advent of modern technology, it has become standard practice to use colour in a wide range of pictures, from graphs to micrographs. However, colour images produce problems of accessibility for a minority of people who do not have the full range of colour vision. This article suggests ways to maximise sharing of information with this minority.

The most common differences in colour vision are caused by the visual pigment protein (opsin) in either the red or green cones being missing or anomalously similar to the opposite channel (green or red respectively). Opsin genes are on the X chromosome, so the minority affected by such allelic polymorphisms are mostly male. The size of this minority varies between different ethnic groups, for example: in Caucasians: 8% of males and 0.5% females. This means that a paper using colour sent to three reviewers two of whom are male has a 16% chance of being seen by someone whose colour vision is of the minority type. Such people are commonly referred to as colour-blind, but this term is not accurate. Also, it is not always desirable or true to consider the genetic majority of people (so-called "normal") as better, particularly relating to colour vision [1], which is the source of social discrimination in some countries. To avoid this, colour vision is here described as being either the majority or the minority type.

For all computer generated images, the data is digital, and so colour can be applied or varied according to one's choice using software such as Microsoft Excel™ or Adobe Photoshop™. Producing an image accessible to all depends on the type of information it contains. I have identified three categories: diagrams, simple two colour pictures, and complex two-colour or three-colour images.

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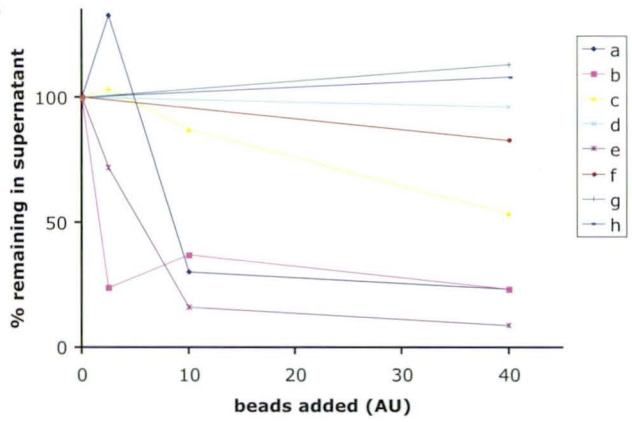
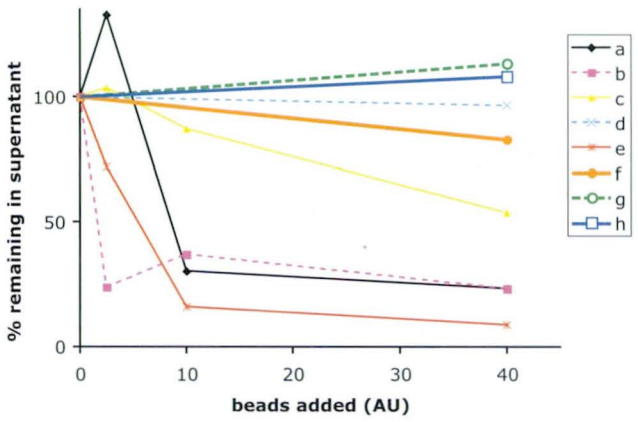
Figure 1. Some colours are more equal than others

A





The two graphs both show a single experiment relating to a pull-down of an activity on beads.

(A) uses the default settings provided by Microsoft Excel™.

(B) has been adjusted to make the data sets clearly identifiable. In general, diagrams should be designed in black and white, so that they work as far as possible without colour, which is added as ornamentation only. Thus, the most important change is enlarging symbols and lines. When choosing colour, avoid pure red, green or blue, and vary brightness as well as hue (see Fig. 3). Also, avoid using colour names to identify objects, as this will confuse the minority.

A palette of colours suggested by Kei Ito (Tokyo) is:

	CMYK (%)	RGB (0-255 scale)	RGB (% approx)
Black	0,0,0,100	0,0,0	0,0,0
Reddish purple	10,70,0,0	204,121,167	80,50,70
Yellow	10,5,90,0	240,228,66	95,90,25
Sky blue	80,0,0,0	86,180,233	35,70,90
Vermillion	0,80,100,0	213,94,0	80,40,0
Orange	0,50,100,0	230,159,0	90,60,0
Bluish green	97,0,75,0	0,158,115	0,60,45
Blue	100,50,0,0	0,114,178	0,45,70

Category 1

Category 1 applies to all diagrams, including graphs (Fig. 1), where colour allows more information to be highlighted. Here, the minority types of colour vision still allow detection of many colours (in addition to black, white and greys in-between), but the choice of colours should be made carefully (Fig. 1B).

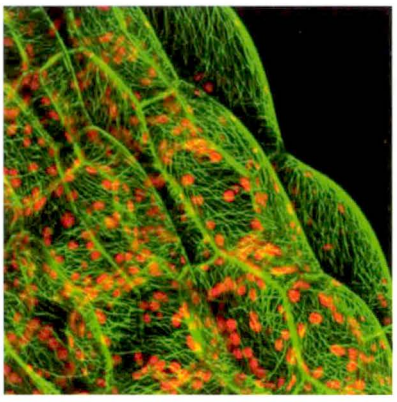
Category 2

In Category 2, two sets of information that are inherently quite different from each other are superimposed. In cell biology, this applies to images where two unrelated cellular structures are imaged together (Fig. 2, also see cover), and colour is used to demonstrate the two contrasting distributions. Although the colours may overlap, the overlap itself does not contain critical information.

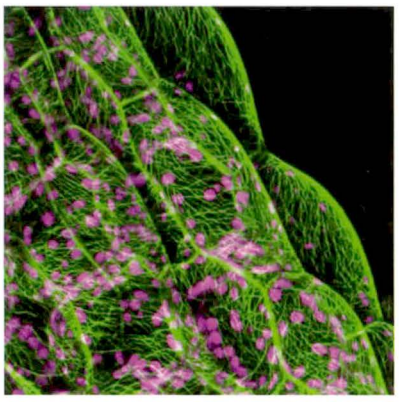
In the example shown, one channel sets landmarks for the other. In these instances, two colour images are typically shown as a single merged panel. But because loss of red/green discrimination is the most common phenotype of the minority with altered colour vision,

Figure 2. Recolouring simple two-colour micrographs where overlap is not crucial

A



B



(A) A red/green image of *Arabidopsis* hypocotyl cells with the chloroplasts fluorescing red, and microtubules decorated with GFP.

(B) A magenta/green image of the same data. In Photoshop™ the image was converted to RGB mode, all the information in the red channel was copied into the clipboard, and pasted into the blue channel. The same result might be achieved during initial imaging, if software allows the Look Up Table (LUT) of the original red channel to be changed to magenta. This works well for the minority, and does not reduce information for the majority, because colour comparison on a pixel by pixel basis is not important. Image kindly provided by Juliet Coates.

Figure 3. The human visual system is trichromatic, but does not treat colours equally

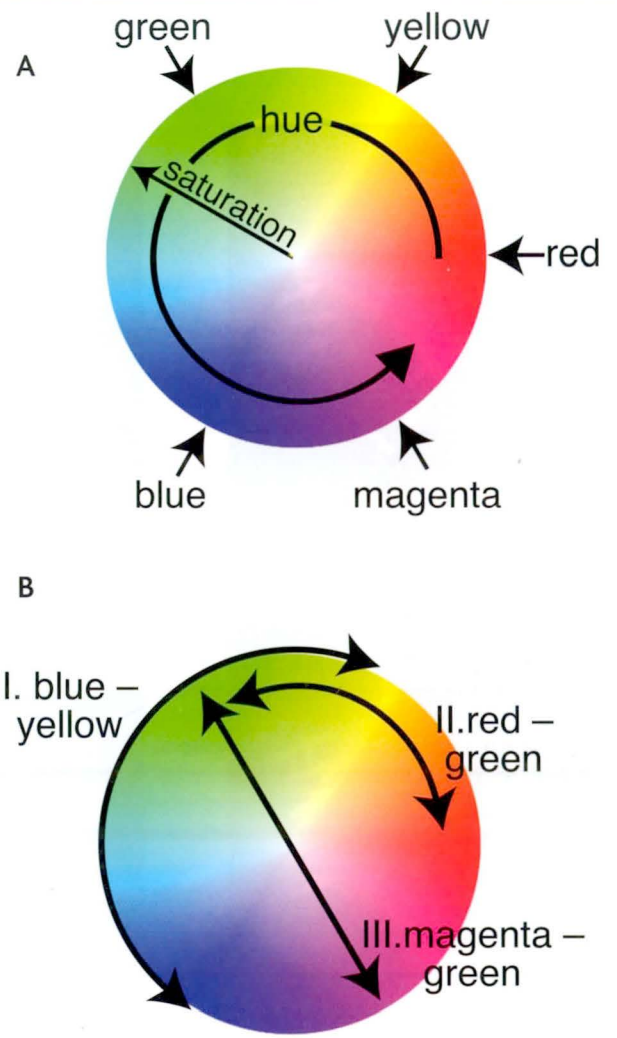
(A) Hue and saturation represented in a single two dimensional colour wheel. Here all colours are at maximum brightness (i.e. with no added black).

(B) The same wheel used to represent three colour axes: I. blue/yellow (via green), II. red/green (via yellow), and III. magenta/green (via white).

Both the human visual system and digital cameras are trichromatic, but the visual system does not treat the three colours equally. Instead it concentrates on two axes: blue vs. yellow (which in trichromats is the sum of red and green), which evolved many millions of years ago; and red vs. green, which arose with the duplication of the red/green opsin recently in primate evolution. The colours at the poles of these axes are described as complimentary, meaning that mixtures between them are not perceived as such: we do not experience reddish-green or yellowy-blue, but we can locate colours along either axis. Thus, red/green images used in cell biology approximate the naturally occurring red-green axis, with overlap perceived in the spectrum of hues red<–>yellow<–>green.

By comparison, magenta/green images use a computer-created spectrum of magenta<–>white<–> green. Although guaranteed to be detectable by the minority, it only has two hues, and varies by degree of saturation (white is 0% saturated, green and magenta 100%). The key issue is that this type of spectrum does not maximally use the ability of the majority type of colour vision to discriminate hues, so these people find it less informative.

In conclusion, no single solution suits all, and a happy compromise might be to use two systems in parallel, one for the majority and one for the minority (see Figure 4).



almost any combination of colours is preferable to red and green. A simple way to generate an alternate colour pair is to convert the red channel into magenta (Fig 2B).

A similar approach can be extended to three colour images (say red/green/blue) only if the types of information being conveyed are radically different, but for three colours the manipulation of channels is more complicated, as there is no empty channel to paste data into, and so two signals have to be combined within a single channel, for example: a red signal has to be converted to magenta by adding it to the blue channel which already contains the nuclear stain. This can be done in Photoshop™ by pasting extra data into a new layer.

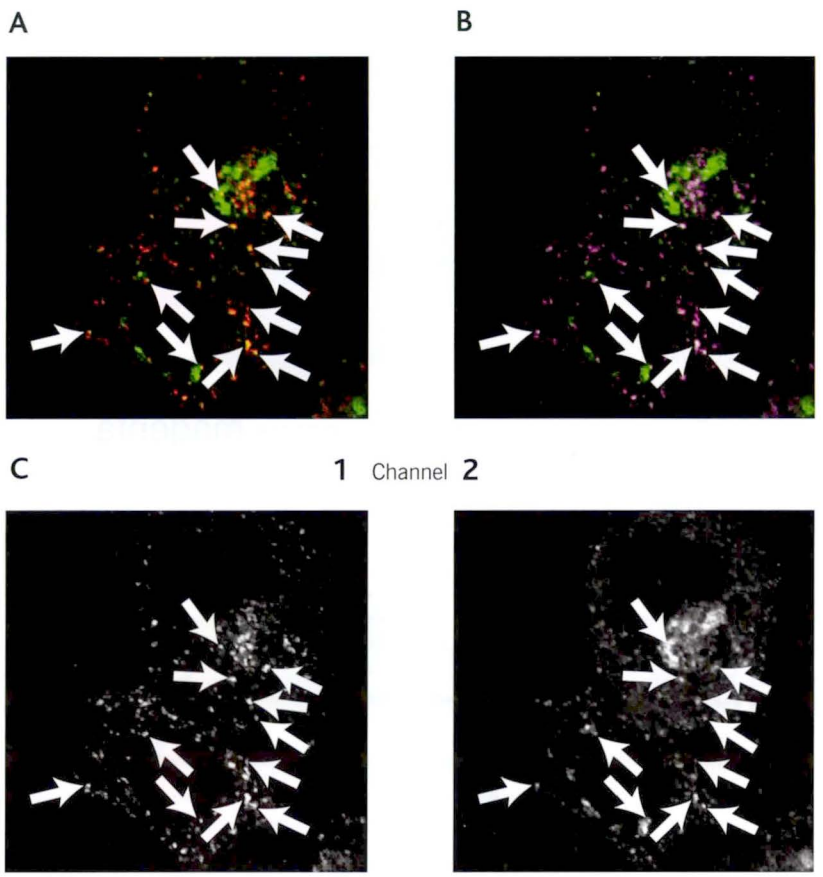
Alternatively, www.vischeck.com/daltonize, run by Bob Dougherty (Stanford) and Alex Wade (Smith-Kettlewell), performs an on-line separation of red and green on two and three colour images using a more complex algorithm that manipulates brightness as well as colour. However, three colour images might best be allocated to Category 3 (see below).

Within the community of cell biologists, it has been reported that the magenta/green approach does not work well [2], while others stress its importance [3, 4]. In my opinion the problems arise with a specific type of image that contains two sets of highly overlapping information, in particular two possibly colocalised intracellular markers with punctate distributions, a situation common in membrane cell biology, where overlap is demonstrated by the way the two colours merge to create an entire spectrum of colours, so that the precise extent of overlap is determined by the colour. As explained in Fig. 3, the combination of red and green for this type of image is particularly advantageous for the majority, because of the way information on colour is treated by the visual system. By contrast, magenta/green images do not use the natural system of colour mixing, and do not convey the full range of information to the majority of people. As the merging of colour is treated very differently by the visual system and by computer software, there appears to be no cure-all approach to colour manipulation in images that is guaranteed to satisfy 100%.

Category 3

Therefore, I suggest a third category for images where two markers overlap or are highly similar. To present these images, the separate channels are shown individually (i.e. not overlapped) (Fig. 4). Sometimes, two intracellular markers might be highly related in distribution, but in fact be adjacent with marginal overlap. Therefore, it is important that the typical relationship between the two markers be indicated with a set of arrows placed in precisely the same place on the two separate images. This can be achieved using the "Align" functions in programmes such as Adobe Illustrator™ or Microsoft Powerpoint™. As someone with minority colour vision, I can vouch for this approach personally.

Figure 4. Treating complex two-colour micrographs where overlap is crucial



(A) A red/green image of two markers with punctate distributions inside mammalian cells detected by immunofluorescence (kindly provided by Adam Grieve).

(B) The same data as a magenta/green image.

(C) The two separate images in black and white. Arrows mark the most prominent double-positive puncta. While an image such as (A) contain maximal information for the majority, it is largely useless for the minority. Images such as (B) and (C) should be made available to allow the minority to assess overlap. (C) provides extra light, but the appreciation of overlap must be indirect; (B) does not use the trichromatic colour system of the majority to maximum advantage.

Even though neither image is ideal, the combination offers the best chance for the minority to access this category of image.

A mistake that is often made is that false colour (e.g. red or green) is used for single channel images. While this may help identify the channel, a simple label suffices for that, while the false colour causes a considerable reduction in the information conveyed, no matter what colour vision capability. The biggest problem occurs when looking at printed images. CMYK inks do not reproduce RGB colours, and the inks saturate, failing to show the higher range of signal intensities, in particular for green (all pixels above 50% green appear the same). Therefore, greyscale (black & white) should be used for all single channel images. Even on computer screens using red or green is also not as good as greyscale, which produces more light, and so provides more visual information. In journals that are pressed for space, if it is not possible to show the extra images next to the colour merge, then it would be acceptable to make the extra black/white panels available as supplementary information on the web. The inclusion of a magenta/green merge might be helpful, although more experience of this is needed.

Here I have suggested a set of adaptations to colour images that increase access for people with minority types of colour vision. A much more important step will be the definition of standards for the use of colour in society at large. Progress in this area is being helped by the efforts of a few individuals (Kei Ito has successfully introduced changes to maps and all signs, i.e. Category 1, in the Tokyo underground system), and by public knowledge that some members of the minority are highly influential (Bill Clinton for one). To address the concerns of both majority and minority [2-4], it will help if a constructive debate is opened. Maybe our field can lead the way, and aim to reach a consensus view that can be adopted by national societies of cell biology and the relevant international journals. But, as hinted at by the majority/minority terminology used here, the question is political, where every colour image counts as a vote.

ACKNOWLEDGEMENTS:

I have based a good deal of this article on information gained from Kei Ito, University of Tokyo. He has campaigned successfully for changes in use of colour throughout Japanese society, and runs the excellent web-site http://jfly.iam.u-tokyo.ac.jp/color/ with Masataka Okabe. This provides many more details. In addition, I would like to thank Andrew Stockman (UCL), Catherine Rabouille (Utrecht), David Stephens (Bristol), Juliet Coates (Birmingham, UK) and Adam Grieve (UCL) for useful discussions and data.

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Stem Cells 2006

14–17 December 2006, Cancun, Mexico

This meeting was organised by Fiona Watt (Cancer Research UK) and Abcam, and brought together scientists from all around the world to discuss many varied aspects of stem cell research.

We arrived in the normally sunny Mexican seaside resort of Cancun to find pouring rain and flooded streets, but this was more than made up for by our luxurious venue at the Hilton Golf and Spa Resort. To open the conference the keynote speech was given by **Rudolf Jaenish** (MIT, Cambridge), who gave an interesting overview of the issues facing scientists trying to utilise pluripotent cells for medicinal purposes, focussed in particular on the issues involved with using nuclear transfer to generate patient-specific embryonic stem cells. Many challenges remain in this area, including improving the efficiency of the transfer techniques, understanding the significance of the crucial components such as the 'pluripotency genes' *oct4*, *nanog* and *sox2* and the epigenetic states of pluripotent cells, and tackling ethical issues on the use of human eggs.

The next morning the conference started in earnest, with the first session entitled '**Stem Cells and Cancer**'. **Sean Morrison** (Howard Hughes Medical Institute / University of Michigan) was first up, examining the delicate balance between self-renewal promoting proto-oncogenes and tumour supressors. He focussed on the requirement for the proto-oncogene Bmi-1 in stem cell self-renewal, as evidenced by knockout mice having a depletion of adult stem cells and a reduced capacity for forming neurospheres, and a downsteam tumour repressor named Ink4a. Ink4a knockout mice lose some of the reduction in stem cell numbers seen with normal ageing. Also giving talks in this session were **Charles Vinson** (National Cancer Institute, Bethesda) on the role of AP-1 in epithelial tumour lineage and **Monica Nister** (Karolinska Institute, Stockholm) speaking on the effect of PDGF on glioblastoma brain tumours. Last up before the break was **Connie Eaves** from the University of British Columbia in Vancouver, looking at regenerative assays to define the properties of stem cells in both the hematopoitic system and mammary gland. After the break the session continued, including a talk by **Hans Clevers** (Netherlands Institute for Developmental Biology) on the role of Wnt and notch in maintaining intestinal crypts, and some very pretty trichromatic pictures from **Irv Weissman** (Stanford University School of Medicine) demonstrating the non-clonal origins of hematopoetic cells.

After a long afternoon break to enjoy the beach or the pool, the evening session was entitled '**ESC differentiation and nuclear reprogramming**'. It began with **Kevin Eggan** (Harvard University) examining the optimal way to carry out nuclear transfer, including the advantages of using unfertilized versus fertilized oocytes and improving efficiency by using cells arrested at metaphase. Continuing the theme of working towards patient specific ESCs, **George Daley** (Harvard Stem Cell Institute) spoke about the possibilities of using ESCs generated by parthenogenesis, the development of an embryo directly from an unfertilized oocyte. After dinner was the well-attended poster session, consisting of two sessions and almost 100 posters. I enjoyed presenting my poster on 'Hypothalamic Stem / Progenitor Cells' and received some useful and encouraging comments from a wide range of people.

The session continued the following morning, starting with a presentation from **Ron McKay** (Bethesda). He examined the control of fate decisions in differentiating cells by devising an experiment to trace the fate of individual cells within a culture, interestingly demonstrating that lineage could be determined before the cells were induced to differentiate.

The third session was entitled '**Differentiation potential of adult stem cells**,' and centred around stem cells from a wide range of adult tissues. It began with **Amy Wagers** of the Joslin Diabetes Center, Boston, describing her research into hematopoetic and myogenic stem cells. She demonstrated that skeletal muscle precursor cells could be isolated using a variety of phenotypic markers and transplanted into mice with muscular dystrophy, where they successfully generate both healthy muscle and new precursors. **Simon Smukler** (University of Toronto) talked about pancreas-derived multipotent precursors in mice, which are capable of differentiating into both pancreatic and neural cells. He described the evidence that they were not derivatives of neural crest cells, but were insulin positive suggesting they may represent a relatively undifferentiated population of precursor cells with a wide differentiation potential. He also demonstrated the presence of a similar population of cells in the human pancreas. Also from the University of Toronto, **Freda Miller** explained her work on skin-derived precursors. As well as functioning as dermal precursors these cells may be derived from the neural crest, and can be induced to produce Schwann cells. This could potentially be used therapeutically to remyelinate axons after spinal injury.

After another free afternoon, and a vigorous volleyball competition amongst the more active delegates, the fourth session focussed on the theme of stem cell evo/devo, microRNAs and retrotransposons. This proved to be a particularly diverse session, with subjects ranging from the formation of the various different structures of feathers (**Cheng-Ming Chuong**, University of Southern California, Los Angeles) to de-differentiation in lens regeneration of the newt (**Nobuyasu Maki**, Center for Developmental Biology, Kobe). Afterwards we were treated to a buffet barbeque on the beach, followed by a limbo competition and salsa dancing.

The final morning's talks were based around '**Epigenetics and asymmetry**.' **Wolf Reik** (Babraham Institute, Cambridge) looked at the role of epigenetic reprogramming in pluripotency and development. He described the extensive DNA demethylation that is seen in fertilized zygotes and primordial germ cells, and hypothesized that Aid and Apotec1 may be involved in a demethylation pathway. **Brian Hendrich** (University of Edinburgh) talked about the role of epigenetic silencing in cell fate decisions, focussing in particular on Nucleosome Remodelling and Histone Deacetylation co-repressor complex (NuRD). He demonstrated that NuRD is required for both the conversion of the inner cell mass to embryonic stem cells and the transition to a lineage commitment, but not for ESC maintenance. **Jurgen Knoblich** (IMBA, Vienna) looked at asymmetrical stem cell divisions in *Drosophila*, in particular the role of the growth regulator Brat, which is asymmetrically segregated to determine daughter cell proliferation.

We had one final (and as always very tasty) lunch, and then it was time for everyone to disperse to head home, enjoy an extra day or so of sun, sea and sand, or for a very lucky few of us to embark on an extended holiday seeing the sights of the Yucatan peninsular. Overall this was a very entertaining and interesting conference, and I was impressed that there seemed to be something for everyone by covering a wide range of topics within what is a very large and diverse field. It was certainly useful to broaden my knowledge of the topics studied and issues faced by people working in very different areas of stem cell biology to my own, as well as picking up a few ideas for my own research. I am grateful to the BCSB for an Honor Fell Travel Award and to the BSDB for awarding me a travel grant, both of which enabled me to attend this conference.

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Biology of B cells in health and disease

6–12 February 2007. Banff, Alberta, Canada

{ Banff is situated in the heart of the impressive and very scenic Canadian Rockies and the conference was located at the equally impressive Fairmount Banff Springs. This was my first international conference and it was great to have the subject entirely focussed on B cells, which are often regarded with lesser importance to the mighty T cell. The combination of the amazing location, my first skiing trip (!) and good science and scientists all made for a rewarding experience for this final year grad student. }

The conference had a relatively broad subject title and covered a wide range of B cell topics. The conference started by examining the molecular events during B cell development. This was kicked off in the Keynote address by the well renowned **Michael S. Neuberger**, who gave a well rounded talk on antibody diversification through DNA Deamination. He focussed on past and present work on AID (Activation-Induced Deaminase), a key enzyme in B cell development which is involved in Somatic Hypermutation and class switch recombination. AID creates DNA base mispairs in the immunoglobulin gene, which then act as a trigger for switch recombination. Michael highlighted the pertinent questions still remaining in the field of AID research, for example how the AID is targeted to the correct parts of the immunoglobulin loci.

The first full day of the conference started with a very generous

and satisfying Canadian breakfast in the lovely surroundings of the Fairmount. The morning session was entitled B cell development and gene expression. One memorable talk by **Harinder Singh** (University of Chicago) spoke about his lab's work on the regulation of Ig gene rearrangements during B lymphocyte development. He spoke about a model for distal VH gene rearrangement, which they hypothesised involved movement of the gene to the nuclear interior from the nuclear lamina. To test this they used a GFP construct, which they were able to inducibly fix at the nuclear lamina and show that this did indeed affect the VH gene rearrangement.

On the following day, as well as the morning and afternoon plenary sessions there were also a range of workshops held in the afternoon. There were three separate worskshops all of which lasted 2 hours, with shorter, less formal talks. I attended an interesting workshop focussing on the development and function of B cell subsets, which opened my eyes to a lot of the key factors involved in B cell development. For example, **Natalie Giltiay** (Cleveland Clinic, USA), spoke about Act1, which regulates the survival and maturation of transitional B cells by negative regulation of BAFFR and CD40 signalling. This resulted in higher autoimmunity in Act1$^{-/-}$ mice.

Another particularly interesting talk was presented by **Yuying You** (University of Alabama, Birmingham, USA) whose subject was the role of CD19 in the development of the marginal zone. As the speaker pointed out CD19 is not simply for the use of Cre knock out mice or as a pan B cell marker. It has many more roles other than its known involvement in B cell receptor signalling. He showed that CD19 knockout mice had no marginal zone and that the precursors were there, they just couldn't get to the right place. By adoptive transfer of wild type CD19 B cells, they showed that the failure of the knock out cells to enter the marginal zone is a cell intrinsic defect and not as a result of a deficient microenvironment. He also mentioned that CD19 binds to follicular dendritic cells and that this interaction could potentially be used to identify a ligand.

Later that evening we were presented with the first talk on what was the "hot" topic of the conference – *in vivo* imaging of mouse germinal centre (GC) B cells. The relatively recent advent of 2-photon microscopy has now enabled live, real-time imaging of bigger structures in living organs or mice and for scientists to put to test theories that have been around for decades. 2-photon microscopy (as the name suggests) uses two photons to activate the fluorophore in a specific focal plane. This means decreased resolution but allows greater depth of focus and imaging of thicker samples.

There are three groups working in this area and two papers had recently been published by Allen et al., (2007) and Schwickert et al., (2007) in Science and Nature respectively. **Jason Cyster** (University of California, San Francisco, USA) spoke about the work published in Science. They showed that GC B cells are highly motile and extend long processes and that they transit between the dark and light zones and divide in both regions. They also showed that the GC B cells formed few stable contacts with GC T cells despite frequent encounters. The T cells were also seen to carry dead B cell blebs. From the imaging they were able to measure the speeds of the B and T cells and showed that the B cells led the T cells when they were alive and the T cells led the B cells when they were dead. They showed some attractive and exciting movies. This work had been published just prior to the conference and it was great to have the opportunity to see such recent, important and novel work presented-with movies! As a cell biologist it was good to see some "action" especially in the field of immunology, which is often seemingly slow (on the whole) in adopting modern imaging techniques.

Following another good dinner, or what the Canadians called a "light snack", it was time for the second poster session of the conference. The poster sessions were held every evening in the two rooms where our dining tables were set, which allowed for nice relaxing viewing following the dinners. On this day, I presented my poster. Having never presented my work at an international conference I was feeling quite nervous and had visions of a long night standing alone by my poster. However, I am pleased to say that I was engaged in discussions all evening. I was extremely pleased with the response to my work and with the opportunity to discuss it with some excellent scientists. It was good to put some faces to familiar names from the field.

Over the next few days there were many more appealing talks, which covered a wide variety of B cell topics. Personally, I found it particularly interesting to hear more about the B cell transcription factor IRF4. In terms of B cell differentiation the major player has always thought to have been Blimp-1. There is no doubt that the release of Blimp-1 repression is important for plasma cell formation, however, it now seems that there is an emerging role of IRF4 upstream of Blimp1, as presented by **Ulf Klein** (Institute for Cancer Genetics, Columbia University, New York). The conference finished on the Sunday evening with the usual drinks and dancing

Overall it was a thoroughly enjoyable and rewarding conference and I would like to thank my sponsors again for the opportunity to go. I met a lot of interesting people and returned to work in London, not only inspired and determined to do well in my final year of research, but also with a new found love of skiing.

I would like to express a big thank you the BSCB for providing me with a Honor Fell Travel award, which helped me to attend the Keystone conference in Banff, Canada.

Semra Kirk

ABCD and UK Adhesion Society Meeting: Mechanisms of Signal Transduction in Cell Adhesion and Differentiation

30–31 March 2007. Rome, Italy

Each year the Italian Association of Cell Biology and Differentiation (ABCD) holds a meeting on "Mechanisms of Signal Transduction in Cell Adhesion and Differentiation", and this was the first time that the Association has held a joint meeting with the UK Adhesion Society.

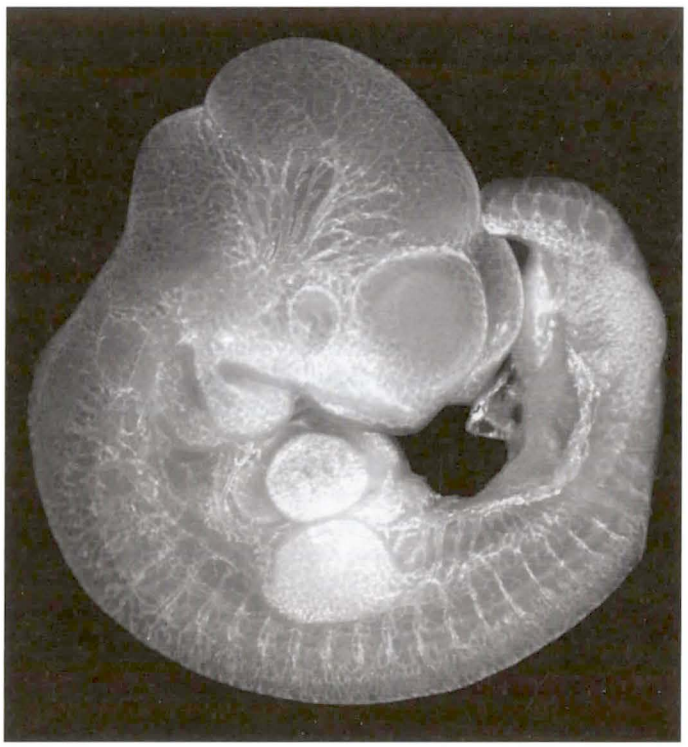
The meeting was organised by **Rita Falcioni** (Regina Elena Cancer Institute, Italy), **Emilio Hirsh** (University of Turin, Italy) and **Charles Streuli** (University of Manchester). The venue was the Hotel Visconti Palace, in the centre of Rome, the major world city of the Renaissance.

This was a relatively small meeting attended by about 70 participants. The aim was for young scientists to present their work to both UK colleagues and to their counterparts in Italy working on cell adhesion. It also provided an excellent opportunity to discuss adhesion mechanisms informally and to establish collaborations.

The two-day programme consisted of three sessions, focussing on (1) cell migration, (2) mechanisms of adhesion-mediated signal transduction, and (3) molecular organisation of the cell-extracellular matrix (ECM) interface, in which the main protagonists were the thirty PhD students and postdocs selected to give short oral communications. These were enriched by the high quality questions and discussions initiated by the audience and chairpersons, which included the presence of pioneers in adhesion research such as Professor Gareth Thomas (King's College London). In addition, there was also a crowded poster session that ran on the second day for two hours with over twenty posters.

The highlight of the meeting for me was the plenary lecture given by **Arthur Mercurio** (University of Massachusetts Medical School, USA). He gave an outstanding talk entitled "**Adhesion-mediated signalling in tumour invasion and metastasis**". He brought us a fantastic compilation of mechanisms that underlie the genesis of invasive carcinoma and the progression to metastatic disease, with specific focus on breast and colon carcinoma. He spoke about integrin alpha6beta4 and invasive carcinoma. His group pioneered studies which established that this integrin plays a pivotal role in functions associated with cancer progression through its ability to influence other receptors and key signalling pathways, such as the EGF-receptor family and phosphatidylinositol 3-kinase (PI3K)/Akt pathway. Professor Mercurio also discussed epithelial-mesenchymal transition (EMT) and how integrin alpha(v)beta6 expression and function are regulated during the EMT. In addition, he described how specific members of the Rho family GTPases, such as RhoA and RhoC, are also regulated during EMT.

Of the many excellent presentations, my favourite short talks included that given by **Silvia Giampieri**, from **Erik Sahai's** lab (Cancer Research UK, London), on the first day in the cell migration session. She used multiphoton confocal microscopy to examine the migration of metastatic breast cancer cells in mice. Her work revealed that the majority of cells within the primary tumour are non-motile, and that the motile cells are localised in areas where metastatic dissemination occurs. Furthermore, once cells have metastasised to lymph nodes they become non-motile. Interestingly, she found that the acquisition of motile phenotype in the metastasising cells is correlated with a transient activation of TGF beta signalling, highlighting a role for TGF beta signalling in cancer progression and metastasis.



Above: A whole mount immunofluorescence stained endothelial-specific Rac1-deficient E10.5 embryo. Blood vasculature was identified using endomucin antibody, and endothelial-specific marker. Intersomitic vessels, endocardium, and perineural plexus are present and well developed suggesting that Rac1 is not required for developmental sprouting angiogenesis.

Marieke Frasa, from **Vania Braga's** lab (Imperial College London), also gave a great talk. She presented data on the Rac subfamily signal transduction pathways, which also play a pivotal role in tumour

progression. Her group previously demonstrated that constitutively active Rac1 induces the disassembly of E-cadherin complexes from junctions in human keratinocytes. Frasa explained that the molecular mechanism via which Rac promotes disruption of cadherin-dependent cell-cell adhesion requires the activation of its target effector PAK.

The day closed with a conference dinner at the restaurant of the same hotel. The meal provided an excellent environment for PhD students, postdocs and PIs to interact and talk about their current and future research plans and also to seed collaborations.

On the second, and last, day, the morning session focussed on the mechanisms of adhesion-mediated signal transduction. I was privileged to have been given the opportunity to present some data from my PhD project, supervised by Kairbaan Hodivala-Dilke (Cancer Research UK Clinical Centre, London). My talk was about the role of Rac1 GTPase in vascular development, a complex process that involves changes in endothelial cell adhesion capacities and migration. We have created endothelial-specific Rac1-deficient mice and found that Rac1 is not required for developmental angiogenesis but is necessary for blood vessel maintenance and, most importantly, normal lymphatic vessel function. I was pleased with my presentation since I had good feedback and received interesting questions. I also had the opportunity to have fruitful discussions with other scientists during meals and coffee breaks.

James Keeble's talk, from **Charles Streuli's** lab (University of Manchester), focussed on the mechanisms by which Focal Adhesion Kinase (FAK) regulates anoikis (a form of apoptosis) and, therefore, tumour progression and metastasis. He has generated a constitutively active form of FAK, myristoylated FAK (mFAK), mutated specific residues within mFAK and determined their contribution to cell survival. He found that mammary epithelial cells are sensitive to anoikis and require a FAK-paxillin interaction and/or the presence of Grb2 binding site on mFAK for survival. His data also suggest that FAK propagates survival signals through distinct pathways in different cells.

Valentina Folgiero, from **Rita Falcioni's** lab (Regina Elena Cancer Institute, Italy) spoke about the involvement of integrin alpha6beta4 in mammary tumour progression. In particular, she found a molecular mechanism by which this integrin exerts its survival function in carcinoma cells. This mechanism implicates the regulation of ErbB-3 expression by integrin alpha6beta4 with the consequent formation of ErbB-3/ErbB-2 heterodimer that promotes the alpha6beta4-dependent activation of the PI3K/Akt pathway and therefore the ability of this integrin to reduce tumorigenicity. This study included the analysis of 232 breast cancer specimens that showed significant correlation between the expression of integrin beta4 subunit, ErbB-3 receptor and phospho and total AKT, highlighting the relevance of integrin alpha6beta4 as a target for tumour therapy.

In the evening, the molecular organisation of the cell-adhesion interface session took place. **Alexandre Gringas**, from **David Critchley's** lab (University of Leicester) introduce us to structural studies on the cystoskeletal protein talin. He revealed that the structure of the C-terminal actin binding site (ABS) of talin consists of 5 helical bundles and this ABS also contains a vinculin binding site. This is interesting since vinculin is thought to be recruited to stabilise integrin-talin-actin complexes. He also found that C-terminal fragments are dimeric and dimerisation is important for F-actin binding. The study of the structure of talin contributes to a better understanding about the role of talin in cell adhesion and migration.

James Whiteford, from **John Couchman's** lab (Imperial College London) gave an intriguing talk about how syndecans promote integrin-mediated adhesion of mesenchymal cells in two distinct pathways. He found that syndecan ectodomains, could promote integrin-dependent attachment, spreading and focal adhesion formation independently of heparan sulphate and syndecan cytoplasmic signalling, both of which have been well documented. He showed evidence for the indirect interaction between beta1 integrin and syndecan ectodomains, and the requirement of Rho-GTP and Rho kinase.

Overall, I felt the meeting was a brilliant personal experience especially since it was my first international oral communication. Bringing together scientists of two different countries was helpful in establishing contacts for further collaborations. I am very grateful to the BSCB for the Honor Fell Travel Award that provided me with the opportunity to attend this meeting and to learn about topics related with my field of interest.

Gabriela D'Amico, Cancer Research UK Clinical Centre, London.

57th Annual British Microcirculation Society Meeting

2nd – 3rd August, 2007. Queens University Belfast

Excited by the prospect of meeting up with some other vascular biologists (and tasting a few pints of Guinness), I headed off over the Irish Channel to attend the annual British Microcirculation Society meeting in Belfast, Northern Ireland.

The British Microcirculation Society (BMS) was founded in 1963 "to advance the study of circulation of the blood and other tissue fluids." Four decades later the study of the microcirculation is still of great interest to scientists in a diverse range of fields and the society is still going strong (www.microcirculation.org.uk). Each year the BMS holds an annual meeting comprised of specialist symposia that address different topics relevant to the microcirculation, such as angiogenesis, regulation of vascular tone, the lymphatic system, inflammation, tumour metastasis, cell signalling, cardiovascular disease, renal function and endothelial cell biology. The 57th BMS

meeting was held in April 2007 and was hosted by Tim Curtis at Queens University Belfast.

The meeting was supported by the Juvenile Diabetes Research Foundation (www.jdrf.org) and so, appropriately, the meeting opened with a session on diabetic retinopathy. **Tom Gardiner** (Queens University, Belfast) began with a very clear and informative introduction to the pathogenesis of this disease. Diabetic retinopathy can be classified into non-proliferative and proliferative forms. In non-proliferative diabetic retinopathy the retinal blood vessels undergo destruction, whereas in proliferative diabetic retinopathy, excessive blood vessel growth occurs in the retina. The non-proliferative form is generally a prelude to the proliferative form and it is this proliferative phase that leads to sight loss. A diverse array of intracellular signalling pathways are involved in the pathogenesis of this disease and **Hans Peter-Hammes** (University of Heidelberg, Germany) talked about the latest strategies for treating this condition by using inhibitors of these signalling pathways.

The next two sessions focused on the role of the microcirculation in tumour progression. Bevacizumab (Avastin) is an antibody that neutralises VEGF activity and inhibits tumour angiogenesis. Recent clinical trials have shown that, when combined with chemotherapy, Bevacizumab can significantly extend the survival of patients with colorectal, lung and breast cancer. However, as yet, no predictive markers of response to Bevacizumab have been identified, but a presentation by **Alex Varey** (University of Bristol) shed some light on this topic. For many years it was thought that VEGF can only stimulate angiogenesis, but work from the group of David Bates has shown (a) that differential splicing of the VEGF gene can generate both pro-angiogenic and anti-angiogenic VEGF isoforms (e.g. VEGF165 and VEGF165b, respectively), and (b) that tumours produce variable ratios of these two isoforms (Woolard et al 2004; Cancer Res. 64(21):7822-35). Varey presented an important update to this story, showing that Bevacizumab binds to both the pro- and anti-angiogenic forms of VEGF-A and that overexpression of VEGF165b in tumour xenografts limits the efficacy of Bevacizumab. He suggested that measuring the VEGF165b:VEGF165 ratio in tumours may permit more accurate selection of patients most likely to benefit from Bevacizumab treatment.

Jacqueline Shields (Institute of Bioengineering, Lausanne, Switzerland) shifted the focus to the role of the lymphatic system in tumour progression. Breast cancer can metastasize via the lymphatic system, but the mechanisms used by tumour cells to access lymphatic vessels remain unclear. Shields presented a novel in vitro co-culture system designed to mimic the biophysical factors encountered by tumour cells *in vivo* i.e. a 3D matrix, interstitial flow (IF) and lymphatic endothelial cells. Using this model she showed that tumour cells use IF to create and amplify chemokine gradients to chemotact towards local lymphatics. This work reveals the first evidence that interstitial fluid pressure and autocrine chemokine signals collaborate to permit directed tumour cell migration towards the lymphatics. Jacqueline was awarded the BMS early career investigator award for this work, which has just been published in Cancer Cell (Shields et al 2007; Cancer Cell 11:526-538). As part of her prize, she has the opportunity to organise a Young Investigators Symposium at the 8th World Congress for Microcirculation, taking place in Milwaukee, USA on 15 th – 19 th August (www.microcirccongress.org).

Following on nicely from Jacqueline's story, **Darryl Dunn** (University of Bristol) presented data showing that the chemokine CCL21 stimulates chemotaxis of metastatic melanoma cells towards lymphatics. Moreover, he showed that 'Chemotraps', which are chemokine-binding proteins, block the migration of metastatic melanoma cells, identifying a potential therapeutic intervention for lymphatic melanoma metastasis.

Endothelial progenitor cells (EPCs) are currently a very hot topic in the field of vascular cell biology, so it was appropriate for a session to be devoted exclusively to this topic. The session was dedicated to the memory of Professor John Lever, former honorary secretary of the British Microcirculation Society, who sadly passed away in 2006. Fittingly, the session opened with some personal tributes to John and a moment of silence for a valued colleague and friend. This was followed by three presentations on EPC biology. Angiogenesis occurs via the sprouting of new blood vessels from existing blood vessels. For many years it was assumed that the exclusive source of endothelial cells for this new blood vessel growth is the local vasculature, but growing evidence suggests that EPCs are mobilized from the bone marrow, circulate in the blood stream and can be recruited to local sites of ischemic damage or to sites of active angiogenesis within tumours. However, the mechanisms governing the mobilization and recruitment of EPCs are poorly understood, whilst the importance of their contribution to the process of angiogenesis remains controversial (Bertolini et al 2006; Nat Rev Cancer. 6(11):835-45). **Ashay Bhatwadekar** (Queens University Belfast) presented *in vitro* data suggesting that when endothelial cells undergo apoptosis this releases signals that enhance the recruitment of EPCs to the site of apoptosis. This could be a mechanism via which circulating endothelial cells are recruited to sites of vascular damage. Once present at this site, they might well contribute to the repair of the damaged vasculature. Reinforcing this point, **Dean Kavanagh** (University of Birmingham) showed that EPCs can be recruited to sites of ischaemic injury *in vivo*. Using intra-vital microscopy to track the movement of GFP-tagged EPCs in mice, Kavanagh demonstrated that EPCs home to sites of ischemic damage in the liver.

On the second day of the meeting, the opening presentation returned to the topic of VEGF165b, one of the recently described inhibitory splice variants of VEGF. **Yan Qiu** (University of Bristol) described a transgenic mouse in which VEGF165b is selectively over-expressed in the mammary epithelium, the MVTg mouse. Qiu presented data showing that although these mice are phenotypically normal their mammary tissue is smaller and less capable of producing milk during lactation when compared to wild type mice. This suggests that VEGF165b may play a role in development of the mammary gland and during lactation.

The afternoon of the second day returned to the topic of diabetic retinopathy. **James Bainbridge** (Institute of Ophthalmology, UCL, London) expanded on the potential to use gene therapy to treat eye disease by intraocular administration of vectors carrying therapeutic genes. **Maria Grant** (University of Florida, USA) gave a fascinating talk on the role of EPCs in diabetic retinopathy. She described how EPCs from healthy human donors can home to sites of ischemic damage in the of diabetic mice retina, but that EPCs from diabetic human donors cannot. The failure of diabetic EPCs to home to sites of damage appears to stem from the fact that they have reduced motility. Moreover, Grant's findings suggest that, in the future, diabetic retinopathy could be treated by transplanting EPCs from healthy non-diabetic patients into diabetic patients.

The meeting also featured a poster session containing over 50 posters covering a broad variety of topics including angiogenesis, renal function, diabetes, imaging and calcium signaling. A poster from **Kim Reeves** (University of Sheffield) described an elegant model for studying bone metastasis. A transparent chamber was grafted onto the back of living mice and a mouse metatarsal bone introduced into it. Reeves used intravital microscopy to show that, within days, the transplanted bone was re-vascularised by the host. In the future, the group intend to use intra-vital microscopy in this model to track GFP-labeled cancer cell homing to the transplanted bone and to learn more about the mechanisms of bone metastasis.

I would like to thank the BSCB for assisting me to attend this meeting. It was a pleasure to present my data to a very receptive audience. Along with Darryl Dunn and Kim Reeves, I was lucky enough to be selected by Jacqueline Shields to speak at the Young Investigators Symposium at the 8th World Congress for Microcirculation, taking place in Milwaukee in August. I hear that they brew good beer in Milwaukee too! Wisconsin here I come!

Andrew Reynolds, Institute of Cancer and the CR-UK Clinical Centre, Barts and The London, Queen Mary's School of Medicine and Dentistry

Phosphorylation, Signaling & Disease

16–20 May 2007. Cold Spring Harbor Laboratory, New York, USA.

The pipettes were put down, the lab coat folded away and I boarded the plane to New York!

Situated around 25 miles from Manhattan, near Long Island, Cold Spring Harbor is internationally renowned for its research, conferences and wide range of courses and was the idyllic setting for the Phosphorylation, Signaling and Disease conference. With around 220 delegates, including 50 speakers and 160 poster presentations the conference promised to be intense and very informative.

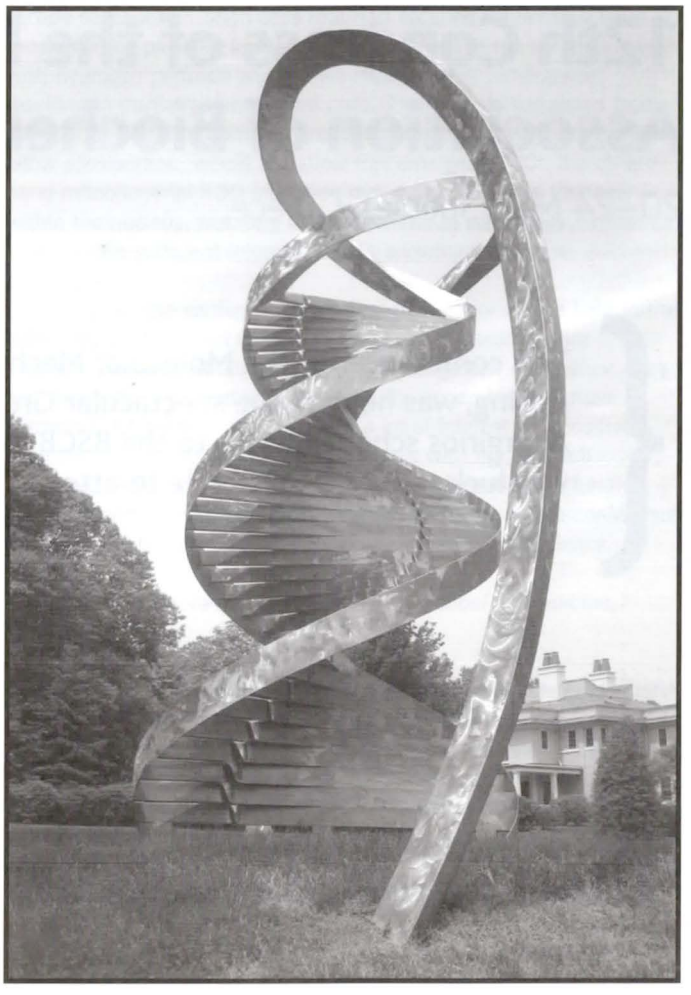
The first evening kicked off with an excellent talk from keynote speaker **Sir Philip Cohen** (University of Dundee, UK) telling us about his work dissecting the signaling pathways that regulate the production of pro-inflammatory cytokines following bacterial infection. This was followed by the second keynote speaker **Carol Greider** (John Hopkins University School of Medicine, Baltimore) describing her fantastic work on telomeres, telomerases and telomere length homeostasis.

After a hearty breakfast, the second session was on receptor-proximal signaling, chaired by **Deborah Morrison** (NCI, Maryland) who gave a superb talk on the function and regulation of KSR (Kinase Suppressor of Ras). The session also included a riveting talk by Jasmine Abella describing the role of the Gab1 scaffold protein in the down-regulation of the Met receptor tyrosine kinase. After lunch was the first poster session with 55 posters in total, including my own, looking at the regulation of Claspin phosphorylation in response to DNA damage or replication arrest. Although the main focus of the conference was not on DNA damage I enjoyed the opportunity to discuss my work with scientists outside of my field and have a look at posters on a wide range of topics from Parkinson's disease to cancer. The poster session was followed by a wine and cheese party held in glorious sunshine by the beach.

The evening session on physiology and disease was chaired by **Anjana Rao** (Harvard Medical School) who talked about her terrific work on calcium signaling in lymphocytes. Another excellent talk in this session was by **Paul Simoncic** (Ontario Cancer Institute) who uses 3BP2$^{-/-}$ knock out mice to study defective bone marrow homeostasis.

The second full day started with a session on cancer which was chaired by **Gary Gilliland** (Howard Hughes Medical Institute, Massachusetts) who set the high standard for the morning's talks by describing his work on the forkhead box family of transcription factors, O-subfamily (FoxO) and their role in cancer. **Dorre Grueneberg** (Harvard Medical School) also talked about differential kinase requirements in genetically related and distinct tumour cell lines. Another marvellous talk was given by **Oliver Hantschel** (University of Vienna, Austria) who discussed the Btk tyrosine kinase being the major target of the Bcr-Abl inhibitor Dasatanib which could potentially be useful in cancer therapy.

After lunch was the second poster session and with 65 posters to look round there was plenty for everyone! I was then lucky enough to have a guided tour around the campus by a current student who told us more about the history of the buildings and how the amusing Bungtown address came about (so called because this is where they used to add bungs to bottles of whale blubber oil for those who are interested). Our guide also allowed us a sneaky peek around some of the labs which were housed in the fantastic old buildings. The evening session on metabolic and stress signaling was chaired by **John Blenis** (Harvard Medical School) and had a range of interesting talks including one from Maho Niwa (University of California, San Diego) describing a novel role of the DFG motif.



The third full day started with a session on signaling pathways in survival and proliferation and was opened with a talk by **Roger Davis** (Howard Hughes Medical Institute, Massachusetts) on signal transduction by stress-activated MAP kinases. **Tony Tiganis** (Monash University, Australia) also gave a great talk on how DNA replication stalls attenuate PTK pathways to suppress S-phase and mitotic progression. The afternoon session on model systems included a fascinating talk by **Pier-Paolo Pandolfi** (Memorial Sloan-Kettering Cancer Centre, New York). This was followed by a classical music concert featuring Liza Ferschtman on the violin and Inon Barnatan on the piano who entertained us with two pieces by Beethoven. The concert was followed by cocktails and the chance to mix with fellow scientists including James (Jim) Watson. We were then treated to a wonderful lobster or steak dinner at the conference banquet.

The conference concluded the following morning with a final session on receptor-proximal signaling II including a terrific talk from **Alexandra Newton** (University of California, San Diego) on the phosphatases PHLPP1 and 2 (pH Domain Leucine rich repeat Protein Phosphatase) which are commonly deleted in cancer.

After the conference I had a wander around the grounds and admired the many wonderful DNA 'monuments' erected around the campus as well as the 'Dance of the Polypeptides', an artist's impression of protein synthesis. Following lunch I headed back to New York for a few days sightseeing where I checked out a New York Yankees baseball match, took in the view from the top of the Empire State building, rode the Staten Island ferry and of course did some shopping before flying back to Edinburgh, the lab and the rain!

Throughout the conference there was the fantastic opportunity to meet a wide range of scientists from various fields, giving me the chance to get advice and make useful contacts. There was always a great deal of scientific discussion, at the end of each presentation, during the poster sessions and of course over meals and at the bar. Finally, a big thank you to the BSCB for their generous Honor Fell Travel award that enabled me to attend this meeting.

Lara Bennett, Biomedical Research Centre, Ninewells Hospital & Medical School, University of Dundee

12th Congress of the International Association of Biochemical Gerontology

20–24 May. Spetses, Greece.

This conference, on the Molecular Mechanisms and Models of Ageing, was held on the spectacular Greek island of Spetses in the Anargirios school. Thanks to the BSCB Honor Fell travel award, I was lucky enough to be able to attend.

After a brief stay in rainy Athens before travelling down to the island of Spetses, we were thankfully greeted by glorious sunshine. This three day conference attracted a diverse group of around 200 scientists from various fields of aging research. The relatively small numbers of delegates ensured a friendly atmosphere, with many discussions taking place both on the podium and during social gatherings.

The conference opened with a talk by **George Martin** (University of Washington, USA), reviewing the overall research regarding clonal attenuation, defined as the gradual depletion of cells from a proliferating culture. He went on to address the implications of clonal attenuation with regarding to age-related pathological processes.

Telomere dependant replicative senescence was then addressed by **Jerry Shay** (University of Texas Southwestern Medical Centre, USA), describing the situation where some short telomeres may form telomere dysfunction induced foci, resulting in the M1 growth arrest termed replicative senescence. Further more some cells bypass this growth arrest until reaching a M2 arrest termed crisis, which leads to genome instability such as telomere fusions. Most of these cells entered apoptosis, where as rare events result in immortalisation commonly due to the up-regulation of telomerase.

Later on in the morning session **Joao Passos** (University of Newcastle) described the induction of replicative senescence by mitochondrial DNA damage caused by the increase of reactive oxygen species, relating to replicative age. The mitochondrial damage was also accompanied with accelerated telomere loss associated with mitochondrial dysfunction, and compromised calcium dynamics.

The afternoon sessions addressed the issue of senescence associated genes and oxidative stress relating to ageing. **Stathis Gonos** (National Hellenic Research Foundation, Greece), described the characterisation of the gene Clusterin/Apolipoprotein (CLU), which was suggested to be a novel survival factor; where its knock down resulted in growth retardation, sensitising the cells to stress and increased rates of cellular death. **Pidder Jansen-Durr** (Institute for Biochemical Aging, Austria), addressed the issue of reactive oxygen species (ROS), which the free radical theory of aging states drives the aging process. The data suggested that both mitochondrial and non-mitochondria ROS sources contributes to the aging process. He described a functional link between changes in oxidative metabolism in aging cells, which impact the energy production and availability. This was followed by an energetic talk by **Richard Faragher** (University of Brighton), who described the undertaking of comparisons of transcriptomics between early and late passaged human vascular smooth muscle, potentially identifying markers distinguishing proliferating cells and senescent cells.

After a brief break, the afternoon sessions continued with a talk by **Tom Kirkwood** (University of Newcastle), describing the evidence of the role of oxidative stress in aging. Mitochondrial defects that accumulate with age, were described to result in increased oxidative stress leading in stress induced damage. This was followed by an interesting talk by **Anthony Linnane** (Centre for Molecular Biology and medicine, Australia). The detailed presentation illustrated the role of superoxide anion and hydrogen peroxide, which constitutes a regulated pro oxidant second message system. Localised sub-cellular production of ROS is essential for normal metabolome and physiological function. The work showed that these ROS species do not lead to the random unregulated macromolecular damage previously hypothesised by the ROS theory of aging, and questioned the role of the mitochondria with regards to senescence.

The second day of talks began with the investigation of oxidised proteins relating to aging. **Tilman Grune** (University of Hohenheim, Germany) described the oxidative stress induced unfolding of proteins, which are recognised and degraded by the 20S proteasome. Subsequently degradation of oxidised proteins in the cell does not take place in all areas of the cell at the same extent. Furthermore, **Bertrand Friguet** (University of Denis Diderot, France) described the loss of proteasome activity during aging. This loss in activity results from either decreased expression of the proteasome subunit, inactivating of these subunits, or formation of inhibitory proteins. He went on to describe the role of the methionine sulfoxide reductase (Msr) system in cellular defences against oxidative stress, which limits oxidation of proteins

In the afternoon a talk given by **Zhenyn Ju** (Medical School Hannover, Germany), looked at the aging and cell function in telomere dysfunctional mice. The work showed that telomere dysfunction induces cell intrinsic checkpoints, such that deletion of p21 resulted in elongation of lifespan, and rescues stem cells in telomere dysfunctional mice. Furthermore, deletion of the exonuclease-1 prevented DNA damage signals at the dysfunctional telomeres, improving the survival of the stem cells. Thus demonstrating its involvement in the processing of dysfunctional telomeres.

The relation of the superoxide dismutase (SOD) enzyme, with longevity in *C. elegans* was addressed by **David Gems** (University College London). Strains lacking SODs 1, 4, and 5, which encodes a cystolic and putative secreted Cu/Zn SOD, were short lived, coinciding with studies in other organisms. Whereas sod 2 and 3 which encodes mitochondrial SOD did not. Thus in *C. elegans* mitochondrial SOD's appears to be unimportant for aging in *C. elegans*.

A lecture by **John Sedivy** (Brown University, USA) on the last day discussed the existence of a mechanism that monitors hypoproliferation, which may limit the proliferation of compromised cells. This network was postulated to occur through Myc expression which is only active in replicating cells, which then leads to activation ofa c-Myc target, Bmi-1 which inhibits p16, eventually resulting in senescence. He then went on to describe the age increase in ROS, where the majority of ROS was found in the perososome, not the mitochondia. Thus he proposed that the production of the amount and proximity of ROS may be tissue specific, and questioned the role of mitochondrial ROS induced senescence.

Olivier Toussaint (University of Namur, Belgium) addressed the stress induced premature replicative senescence. Their work illustrated that hydrogen peroxide induced phosphorylation of p38MAPK (Mitogen-Activated growth factor kinase), triggers overexpression of a transformation growth factor TGF-ß1 by activating the ATF2 transcription factor. The ATF2 then interacts with the hyperphosphorylated RB protein. These cells also displayed limited mean telomere shortening.

A talk by **Sebastien Martien** (Institute of biology, Lille, France), showed that epidermal keratinocytes were able to spontaneously escape senescence. Such cells that had escaped senescence were thought to be partially transformed. Treatment of the keratinocytes with hydrogen peroxide was shown to cause this "emergence" resulting in partially transformed cells. Their results suggested that the lack of oxidative damage, and telomeres that were too short to allow proliferation; would not allow this emergence. On the other hand mitochondrial SOD induction may cause oxidative damage within the nucleus, resulting in mutagenesis of some cells. These cells contain sufficient telomere length allowing them to re-proliferate.

Throughout the conference several porter sessions were held in the hotel. 90 posters from various areas of aging research were displayed, allowing discussions with various groups about their work and methods. I presented a poster on the dynamics of human autosomal telomeres, and I received a lot of interest and positive feedback, and some ideas how to progress with my research.

I would like to thank the BSCB for providing part of the funding, the organisers of the conference, and all the people at the conference for making it an informative and thought provoking experience.

Bethan Britt-Compton, Dept of Pathology, School of Medicine, Cardiff University.

Human Genome Meeting 2007

21–24 May 2007, Montreal, Canada.

The annual meeting of Human Genome Organisation (HUGO) is an exciting conference for scientist working in the field of genetics to understand the role of genes in health and disease. This year marks the 12th international meeting that was held at the Palais des congres in the beautiful city of Montreal.

Thanks to the support of BSCB through an Honor Fell Travel Award, I was able to attend this meeting, which has broadened my knowledge in the evolving field of human genome research.

The first day of the meeting started on Monday 21st May at 16.45pm. This gave delegates from abroad time to adjust to the different time zone. In the opening ceremony, **Leena Peltonen** (HUGO president at the time) addresses the audience followed by plenary session I consisting of exciting talks on recent advances in human genetics. A highlight was **David Bentley's** (Chief scientist at Illumina, UK) talk on the new Solexa DNA sequencing technology that further demonstrates the rapid advancement in genetic research. There was also an interesting talk by **Mike Stratton** (Deputy Director of the Wellcome Trust Sanger Institute) on the patterns of somatic mutation in human cancer genome. He illustrated that "driver mutations" causes cancer while "passenger mutations" just ride along. Also his team have been able to identify 100 new cancer mutations from a group of 500 protein kinase genes that were resequenced.

Other highlights from the plenary sessions were talks on whole genome association studies of complex genetic diseases. **David Altshuler** (Harvard medical school, USA) gave a talk entitled "Genomic variation and inheritance of common diseases". He presented their data on 1464 patients with type 2 diabetes and 1467 controls using the Affymetrix 500K Gene Chip (with 500,568 SNPs). They identified 8 common variants that were significantly associated with the disease and interestingly, two of these were located in the noncoding region. Similarly, **Mark McCarthy** (University of Oxford) gave a talk on the Wellcome Trust Case Control Consortium (WTCCC) project and how it has been success in identifying replicated regions of linkage and the discovery of new susceptibility variants. **Helen Hobbs** (University of Texas, USA) talked about her interest in the genetics of coronary atherosclerosis, looking at both protection and susceptibility. Her group found two non-coding variants within chromosome 9 region and close to another variant that is associated with type 2 diabetes. An emerging theme from these studies is that the variants that are significantly associated with common diseases are either intergenic or intronic but not within the coding region of a gene. Until recently these studies met with limited success, because the tools were not available to comprehensively search the genome. A common focus from the speakers is to understand how the genetic risk factors contribute to human pathophysiology, and to apply such information to improve diagnosis, prevention, and treatment of disease.

Due to the large scale of the meeting, there were concurrent sessions for workshops and symposium, which meant that for some of the talks it was very difficult to choose. The ones that I did attended were very relevant to my research work on identifying the genetic risk factors for paediatric rheumatology. In particular, I attended the symposium entitled genetics of infectious disease and one of the speakers, **Erwin Schurr** (McGill University, Montreal) presented his work on how they identified lymphotoxin-alpha (LTA) as a major gene associated with early-onset leprosy. The LTA gene is of interest to me because it is a proinflammatory cytokine that is known to play multiple roles in the regulation of the immune system and inflammatory reactions. It is also located close to the TNF gene in the HLA class III region on chromosome 6.

In addition to the interesting talks, the meeting addressed the need for researchers to create and use large open population resources. One of the major problems in identifying genetic variants that contributes to common diseases is having enough sample size that is powered to detect genetic effects. This is particularly important in common genetic disorders where minor genetic effects, interacting with environmental effects are often more likely to be involved. To harmonize this, were the initiations of consortiums and the organised collection of human samples know as Biobank. **Yusuke Nakamura** (University of Tokyo) talked about the BioBank Japan project with a collection DNA and sera from 300,000 individual from 66 hospitals across Japan. Other resources includes the Montreal-based P3G (acronym for Public Population Project in Genomics) international consortium and UK WTCCC.

The workshops session dealt with important practical issues such as using an appropriate sample, improvement in the quality control of genotype-analysis software and how to utilize online resources and latest tools. Speakers also encouraged delegates to suggest ways of improving the resources to offer better services.

The poster sessions were busy with 296 posters to view and were accompanied with light refreshments. I was able to present my poster, entitled 'Role of CAPN10 in insulin secretion'. The posters were on display throughout the entire meeting, as well as during scheduled poster viewing sessions, for delegates to view. Internet and email access were also provided.

The organisers provided a conference dinner on the evening before the last day of the meeting. This included a lovely meal with musical entertainment and traditional dancers.

Ebun Omoyinmi, Dept. of Immunology and Molecular Pathology, UCL, London W1T 4JF

FASEB Summer Research Conference on 'Mitosis: Spindle Assembly and Function'

9–14 June, Indian Wells, USA

Indian Wells is an oasis, 3 hours away from Los Angeles, right in the middle of the California desert. The outside temperature raises above 35 °C but inside the conference centre the right temperature put us the mood to listen to excellent talks.

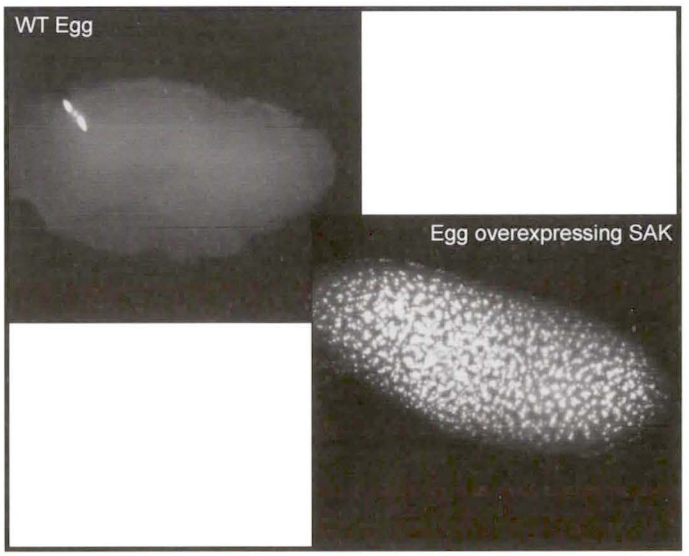
The meeting was focused on mitosis and how spindle formation is achieved, by both the centrosomal pathway and the chromosome-driven mechanism. There were nine sessions in total. The first session was about the G2/M transition and how cells commit there entry into mitosis. The second session was about centrosomes and centrioles, their formation and role in cell division. Spindle assembly was discussed on the third session. Three sections then followed about kinetochores: their assembly and structure, the mechanisms of aneuploidy and also their relation with the spindle assembly checkpoint. The seventh session was about mechanisms of chromosome segregation. Cytokinesis was discussed on the eighth session. The last session, which was very interesting, was on the importance of the spindle as a pharmacological target. In this four-day meeting there were so many outstanding talks and posters that I can not mention all the interesting ones. So, I am just going to point out some of the high points.

Jonathan Pines (Gurdon Institute, Cambridge, UK) gave a very interesting talk about the degradation of the key protein, Cyclin B, which allows progression through mitosis. His group has developed a FRET sensor where the fluorescence of a GFP tagged protein can be measured, allowing for the scoring of protein degradation. They used this method to score Cyclin A and Cyclin B degradation. Cyclin B is known to be destroyed by the APC/C depending on the spindle assembly checkpoint. On the other hand, Cyclin A degradation was thought not to depend on the checkpoint. But with their studies they concluded that although Cyclin A is destroyed before Cyclin B, its destruction depends on the spindle checkpoint because low levels of cdc 20 stabilized Cyclin A. He showed that it's not the movement of Cyclin B from the poles to the centromeres that leads to its destruction. In fact, Cyclin B needs to be at the centromeres in order to be properly degraded. This is very interesting because it indicates that both checkpoint and ubiquitination machineries have to be at the centromeres in order for Cyclin B to be destroyed.

Conly Rieder (Wadsworth Centre, Albany, NY) amazed all of us with beautiful microscopy images. His group is interested in understanding the reason why transformed cells do not arrest in G2 after induction of DNA damage. In non-transformed cells the mitotic index falls to zero when the DNA damage checkpoint is activated or when p38 is activated with anisomycin. After 4 hours cells are still blocked in G2. In contrast, activation of p38 in HeLa cells does not lead to such a big delay in entering in mitosis. Moreover cells that are mutant for p53 and Rb still activate p38 but show also a short delay. Although p38 is present in these tumour cells, it seems that tumours select cells that are not able to respond to p38. By not responding to p38, tumour cells will continue to grow and will enter mitosis even in the presence of DNA damage. Because p38 is still present on those cells they conclude that is not p38 absence that leads to cells transformation.

Tin Tin Su (University of Colorado, Boulder, CO) spoke about Wee1 kinase and its role in mitotic spindle function. Wee1, and also Myt1, are kinases that regulate CDK1 phosphorylation state and, consequently, the entry into mitosis. Wee1 mutant embryos show spindle problems, like multipolar spindles , colliding spindles and detachment of centrosomes from the embryo cortex. Chk2 mutants rescue some of the Wee1 mutant phenotypes, but the phenotype of colliding spindles, for example, is not rescued. In the search for Wee1 interactors they found Dgrip proteins and kinesin 5 that are regulators of spindle formation. Wee1-dependent phosphorylation of these proteins may be

Jordan Raff (Gurdon Institute, Cambridge, UK) presented work on the study of flies without centrioles. DSAS-4 is a coiled-coil protein initially discovered in *C. elegans* as being required for centriole



SAK induces *de novo* centrosome formation in *Drosophila* eggs. Whereas in wild type eggs there are no centrosomes at all, in eggs overexpressing SAK, de novo centrosome formation happens 30 min after eggs are layed and progresses to fill the entire egg. These centrosomes correspond to bona fide microtubule organizing centres containing structurally normal centrioles. α-Tubulin in green. (Rodrigues-Martins et al., Science, 2007)

duplication. In *Drosophila* that is also the case and surprisingly DSAS-4 mutants progressively loose centrioles throughout development but are able to eclode, although they die shortly after birth. The cause of death is probably neurological deficiency, as DSAS-4 mutant flies lack cilia in their chemo and mechano sensors. He has also shown some data regarding CNN mutants where centrioles seem to be missegregated to the daughter cells at the time of division. This missegregation could be due to the fact that in CNN mutants centrioles do not have PCM. Because of these results he concluded that the primary function of the centrosome is to ensure that centrioles are properly segregated during mitosis.

Tim Stearns (Stanford University, Stanford, CA) discussed recent findings on the role of separase in centriole disengagement, a pre-requirement for centriole duplication to occur. He has used C-Nap1 and centrin to be able to distinguish between engaged and disengaged centrioles. He showed that disengagement occurs at the metaphase to anaphase transition and that it depends on separase, that was previously shown to be required for sister chromatid division at the exactly same time point in mitosis. He argues that separase can be important to prevent multipolar spindles from forming, as engaged centrioles can not duplicate.

Alexey Kodjakov (Wadsworth Centre, Albany, NY) discussed the existence or not of a specific site on the mother centriole from which the new centriole, the daughter, is formed. Due to the fact that normally a centriole only gives rise to one new centriole in each canonical duplication cycle it was though that there is some place in the mother centriole that acts as a template and that when that place is filled no other daughter centriole can be formed. They wanted to test this idea. They laser ablated one centriole in HeLa cells arrested in S-phase. After a while they were able to see at the EM level that a new daughter centriole was being formed anywhere close to the mother centriole, varying also the angle that it forms with the mother centriole. With this, he concluded that there is no specific site in the mother centriole that gives birth to a new centriole. They have also done some studies in cells that when arrested in S-phase are able to overduplicate their centrioles. He showed that only when all daughter centrioles are removed new centrioles can form from the mother centriole. Removing only one daughter centriole does not lead to the formation of a new centriole. Interestingly when the mother centriole is laser ablated daughter cells remained attached to each other in a single PCM cloud, without the formation of any other centrioles. With these findings he concluded that PCM is controlling the number of centrioles that are being formed in diplosomes and triplosomes. He proposes a model where PCM aggregation at a particular place leads to the recruitment of proteins involved in centriole duplication allowing centriole formation.

Alexander Dammermann (Ludwig Institute, San Diego, CA) presented work on the study of the dynamic behaviour of SAS-4 and SAS-6. They have developed a very interesting system in which *C. elegans* oocytes are labelled with either GFP-SAS-4 or GFP-SAS-6 and the sperm is labelled with RFP-SAS-4. This allows for the visualization of the timing of incorporation, and also dissociation, of these proteins in relation to the formation of a new centriole. By quantative microscopy he showed that SAS-6 recruitment coincides with central tube assembly during S-phase but that then its levels drop during mitotic prophase. SAS-6 dynamic behaviour is independent of the presence of SAS-4, which indicates that it does not depend on centriolar microtubules. SAS-4 is recruited at S-phase but also at the beginning of mitosis, as it is also part of the PCM, and its levels remain constant throughout mitosis.

Duane Compton (Dartmouth Medical School, Hanover, NH) spoke about the causes that lead to chromosome instability that ultimately can lead to aneuploidy. It is known that both failure in the spindle assembly checkpoint and the presence of multipolar spindles can lead to aneuploidy. His group is trying to understand in which stage of the cell cycle abnormalities start to appear. They specifically tested whether merotelic chromosomes, artificially induced by monastrol, could lead to missegregation of chromosomes. They detected by FISH that monastral treatment leads to the appearance of lagging chromosomes. Cdc4, Mad2, and Aurora A are examples of molecular targets that when absent increase the appearance of lagging chromosomes. With this data they concluded that merotelic attachments, coupled with deficiencies of the spindle assembly checkpoint, are probably the major cause for genome instability.

Karen Oegema (Ludwig Institute, San Diego, CA) presented work on the study of the role of centrosomes and Aurora A in nuclear envelope breakdown in *C. elegans*. In Aurora A RNAi embryos nuclear envelope breakdown is delayed. The same happens in both SDP-2 and SPD-5 depleted embryos but it doesn't happen in TPX2 or dynein depleted embryos. With this she concluded that the centrosomes play a role in the process of nuclear envelope breakdown that is independent of microtubules. They think that Aurora A is a diffusible factor that due to its proximity could induce nuclear envelope breakdown. A model was proposed where Aurora A is at the cytoplasm in an inactive state and then is recruited to the centrosomes where it becomes active, generating a gradient close to the nucleus that eventually leads to nuclear envelope breakdown.

Susan Band Horwitz (Molecular Pharmacology, Einstein College, NY) spoke about the importance of taxol as an antitumour drug. Taxol stabilizes microtubules by reducing their dynamicity that in turn leads to a mitotic arrest followed often by cell death. Because the expression of different tubulin isotypes may have a role in the sensitivity/resistance of tumour cells to taxol, her group is trying to understand which are the mutations present in tumours resistant to taxol. By using mass spectrometry analysis they are also studying possible structural modifications and alterations in the dynamics of α-,β-tubulin dimers in the presence of taxol.

Robert Palazzo (Department of Biology, RPI, Rensselaer, NY) discussed results regarding a new drug HMN-176, that his group has identified as a potential inhibitor of centrosome directed microtubule nucleation. HMN-176 primarily leads to a G2/M arrest by blocking spindle assembly and aster formation in clam oocytes and leads to abnormal spindle assembly in mammalian cells. He proposed that HMN-176 is an anti-centrosome drug that inhibits centrosome-dependent microtubules *in vitro* and *in vivo*, suggesting that the centrosome can be considered as a novel target for the development of anti-tumour therapeutics.

In the end, this FASEB meeting on "Mitosis: Spindle Assembly and Function" proved to be very enjoyable and interesting, where it was possible to hear excellent scientific work, have the opportunity to present my work and meet many interesting people. My thanks go to the BSCB for the Honor Fell Travel Award which went towards the cost of attending this meeting.

Ana Rodrigues-Martins, Department of Genetics, University of Cambridge, UK and Cell Cycle Regulation Lab, Instituto Gulbenkian de Ciencia, Portugal

5th International Society of Stem Cell Research

17–20 June 2007, Cairns, Australia

Over 1900 delegates flew to a location where few would have had the opportunity to visit in their lifetime had it not been for the conference! No words can truly describe the beauty of tropical Cairns, where the wilderness of the rainforest meets the tranquillity of the Great Barrier Reef.

We were given a warm welcome at the conference by the Hon. Dr. Kay Patterson, Senator of Victoria who has been a key player in promoting stem cell research in Australia. Her message encouraged scientists working in the field to continue in hope of finding potential applications of Embryonic Stem cells (ES). However she stressed the importance of communication with the public to understand their view of these advances.

The afternoon began with the Stem Cell niche plenary and **Hongjun Song** (Johns Hopkins University) focussed on adult mammalian neural stem cells and explained the importance of Wnt signalling in promoting neurogenesis in the adult hippocampus. By the use of Wnt inhibitor SFRP3, he showed that proliferation and neurogenesis of adult hippocampal neural progenitors was dependent on Wnt. Furthermore, the roles of extrinsic factors such as GABA, which sets the pace for neurogenesis and intrinsic factor DISC1, that regulates morphogenesis and positioning of new neurones, were outlined.

The role of *Pax* genes in determining the myogenic fate of skeletal muscle stem cells was discussed by **Margaret Buckingham** (Pasteur Institute). With isolation of a pure Pax3/GFP positive population and injection into injured mice, she demonstrated how Pax3/7 was required for the activation of both of the myogenic determination genes; MyoD & Myf5. She also elucidated the role of Pax3/7 in the survival of skeletal muscle progenitor cells.

Another aspect of the conference which especially held my interest was the current research into overcoming the immunological barriers inherent in transplanting embryonic stem cells into an allogeneic host. This session began with a talk by **George Daley** (Harvard Stem Cell Institute) on deriving histocompatible ES cells. He discussed the inefficiency of nuclear transfer compared to parthenogenetic activation of the unfertilised oocyte in deriving ES cells, and went on to explain how parthenogenetically derived mouse ES cells display similar hematopoietic to wild type ES cells. By transplantation of these blood derivatives into irradiated recipient mice, he explained that they have the ability to repopulate the hematopoietic system.

Kevin Eggan (Harvard University) questioned the need for use of unfertilised oocytes for somatic cell nuclear transfer when it is possible to use zygotes. He described how his group had generated mouse ES cells by using temporarily mitotically arrested zygotes which have had their chromosomes replaced by somatic cell donor chromosomes. Each year thousands of IVF generated oocytes are discarded because they have been fertilized by more than one sperm. Eggan argued that these aneuploid oocytes which have the ability to reach cleavage could be arrested in mitosis and have their chromosomes replaced as described in the mouse. Thus genetically tailored human ES cell lines could be generated which may be more ethically accepted and accessible.

Ethical issues are still raising concerns amidst the scientific and wider community and a series of talks on ethics in human ES research looked into various aspects. I attended a talk by **Angela McNab** representing the Human Fertilisation and Embryology Authority (HFEA) in the UK. The focus of her talk was on the recent human-animal hybrid debate which is especially pertinent as two groups have recently applied to undertake such research. She questioned whether the resulting human-animal embryo would be classed human and discussed the moral status of this hybrid; for instance, a possible subversion of the human-animal distinction. However, as long as the embryo is not implanted and assuming this type of research is essential, will its use still raise ethical concerns in the public domain? In contrast, if permitted will this type of research take us closer to science fiction rather than science fact? The HFEA is expected to make a decision about whether such research should be licensed by the end of this year.

Another topic of great interest is the *in vivo* analysis of transplanted functional ES derived cell derivatives into the animal and one such topic was presented by **Christine Mummery** (Hubrecht Lab). She described an efficient and reproducible method to derive cardiomyocytes from human ES cells which are functionally active and produced in such high numbers to permit transplantation into mouse hearts. These cells were labelled with GFP to enable tracking of their fate once transplanted into mice which had undergone myocardial infarction. Compared to control mice, which had endoderm like cells transplanted instead of cardiomyocytes, significant improvement in cardiac function measured by the ejection fraction was observed at 4 weeks post injection. The unreliability of exclusively tracking GFP to account for cells was also remarked on as dead cells are also detected. Unfortunately after 14-16 weeks post injection, this difference in cardiac improvement was no longer significant.

An aspect of the conference which was particularly suitable for final year PhD students such as myself was the 'Meet the expert' over lunch session. I took this opportunity on two occasions; with Richard Boyd of Monash University and Margaret Buckingham, during which we discussed our research and the possibility of a life after the PhD.

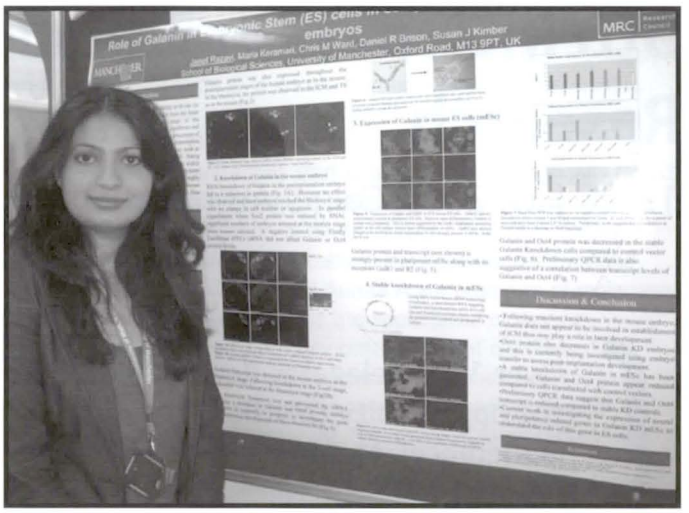
I also had the opportunity to present my work on one of the poster presentation evenings. I am investigating the role of Galanin in mouse ES cells and embryos and am grateful for those who gave feedback on my research.

Shinya Yamanaka (Kyoto University) gave a talk which I particularly enjoyed. Yamanaka was the first to try and make mouse embryonic fibroblasts (MEFs) pluripotent by transfecting a variety of candidate markers known to be involved in maintaining pluripotency in ES cells. He described how they have successfully induced pluripotency in MEFs by changing the selection marker from Fbx15

which was the gene initially targeted to Nanog, with 4 candidate genes needed in MEFs to convert them to an ES cell phenotype: Oct4, Sox2, c-Myc and Klf4. Better induced pluripotent cells were obtained; gene expression appeared indistinguishable from normal ES cells and ES cells were able to give rise to chimeras, although the germline transmission is an inefficient 0.05% compared to Fbx induced pluripotent cells at 0.5%. However, the major problem is that 20% of mice developed thyroid tumours, most probably due to the oncogene factor c-Myc. His group is currently finding other candidate genes and selection markers.

Finally, I would like to thank the BSCB, BSDB and SRF for granting travel awards so that I was able to attend this expensive but highly informative meeting which has proved tremendously beneficial at this final stage in my PhD.

Janet Razavi, MRC funded studentship with S J Kimber and D R Brison, University of Manchester. janet.razavi@gmail.com



American Diabetes Association 67th Scientific sessions

24– 29 June 2007. Chicago, USA

The 67th Scientific Sessions organised by the American Diabetes Association (ADA) was held in the McCormick Conference centre, a short shuttle ride to the south of downtown Chicago. The conference centre is blessed with a striking view of the impressive Chicago skyline merging with Lake Michigan to the north.

Chicago itself is a vibrant city, with the downtown and near north areas busy both during the day and (slightly more pleasantly so) in the evenings. Needless to say, 5 days spent there during a conference is not sufficient to experience everything Chicago has to offer.

This was my first experience of a scientific conference, and with attendance conservatively estimated at 18,000, and over 2,800 abstracts submitted, it was a daunting but exciting proposition. The ADA conference aims to cover all aspects of Diabetes Mellitus, ranging from basic scientific research to all the clinical aspects associated with the disease. This breadth includes many Cell Biology areas. The conference was split into 8 sections, into which relevant oral presentations and symposia were arranged. This enabled the attendees from different fields to more easily focus their attendance to relevant talks. The most relevant presentations to my research were in the Insulin Action / Insulin signalling and Integrated Physiology or Obesity sections.

On the first day, following registration and a lengthy queue to collect conference materials, I attended one of the earliest oral presentation sessions, entitled '**The Skinny on Fat, Depots and Development**'. Oral presentations are two hour meetings, in which eight fifteen minute talks are given about recent published or (in a few cases) unpublished work. The format is exhausting, but potentially extremely informative. The intensive nature of the session allows experts in a given field to glean a significant amount of information, but the speed of presentation often left those less familiar with the field feeling a little lost.

Unfortunately, many presenters in these sessions throughout the conference chose to maximise their 15 minute talk by including as much material as possible, barely pausing to take breath. The more enjoyable and more informative talks were those which concisely and methodically explained their data. Having attended several of these sessions over the duration of the conference, I would like to mention **Stephane Gresta** (Harvard Medical School, Boston, US) and **Henning Kramer** (Harvard Medical School, Boston, US), who both gave extremely informative and clear presentations on Regulation of Fat accumulation by Tbx15 (Oral presentation session: 'The Skinny on Fat, Depots and Development') and The Calmodulin-Binding Domain of the Akt Substrate of 160 KDa (AS160) Regulates Contraction- but not Insulin-Stimulated Glucose Uptake (Oral presentation session: 'Exercise') respectively.

The second day of the conference was dominated for me by the poster sessions, which comprised of 2 hours over lunch, and an hour long poster reception in the evening. The vast poster hall was divided into different categories to make finding posters of interest easier, and the presentation of the posters was also divided between two

days to focus the sessions. This experience was the most enjoyable aspect of the conference, allowing me to meet for the first time several other scientists working in my field and partake in valuable discussions about different aspects of my presentation ('A Common Trafficking Route For GLUT4 In Cardiomyocytes Following Insulin And Energy-status Signalling'). Due to these discussions, I was unfortunately unable to visit other authors and their posters in the same field.

The other main attraction of the second day was the inclusion of two plenary lectures, one of which was a fascinating description of current work investigating genetic susceptibility for disease. In his lecture, **Francis Collins** (National Institutes of Health, Bethesda, US) gave an example of a genome-wide association study examining susceptibility for Type II Diabetes Mellitus, during which he identified specific advancements in techniques which allowed significant reduction in costs for such extensive investigations.

The conference was extremely well supported by commercial companies, and in particular pharmaceutical companies. Although there were a few stalls of interest to basic research scientists, the exhibition hall was dominated by the large pharmaceutical companies, all exhibiting their array of products to monitor and administer insulin for Type I diabetics, or new drugs for controlling Type II Diabetes. It was interesting to see advertising on such a grand scale, although I had to be careful to avoid being cornered by one of the many representatives offering me a blood glucose test!

At each scientific session, the ADA presents the Banting Award to a scientist who has made an outstanding contribution to the field. This year, the Banting Award recipient was **Robert Sherwin** (Yale University School of Medicine, US), who addressed a large audience with a talk entitled 'Bringing Light to the Dark Side of Insulin – A journey Across the Blood-Brain Barrier'. Dr. Sherwin gave a very interesting account of his journey through science while simultaneously describing his work in establishing the ventromedial hypothalamus (VMH) as an important glucose sensor in the brain. This work is particularly important since prior to this work, hormonal control of plasma glucose was thought to be primarily controlled by pancreatic intraislet mechanisms.

The third day also gave me a chance to view posters in the second day of poster presentations. Unfortunately, since the presentation days were staggered, the majority of posters related to my work were unattended, although of particular interest was a late breaking poster presented by **Katsuiko Funai** and **Gregory Cartee** (University of Michigan, Ann Arbor, US). Their poster, entitled 'Contraction-Stimulated Phosphorylation of AS160 is Temporally Coupled with Phosphorylation of CaMKII, but not AMPK or AKT', presented an intriguing study which raised several discussion points.

The final day of the conference was a half day, but included a symposium on AMP Kinase – A Multi-Organ Fuel Sensor. The symposia at this conference were two hour sessions, split into four separate talks. The talks in this session were very informative, and of particular interest to me was the presentation entitled 'AS160 – A Novel Downstream target of AMP Kinase in Muscle. In this talk, **Jorgen Wojtaszewski** (University of Copenhagen, Denmark) presented data showing that previous studies into phosphorylation sites of AS160 had been biased towards certain sites, but recently developed antibodies had enabled his group to produce data on the action of different kinases at different sites on AS160.

Overall, the ADA conference was an extremely positive experience. It allowed me the chance to present my work to a wide audience for the first time, and take advice and criticism from scientists with an incredibly varied background. The magnitude and breadth of this conference is one of its strengths, and being able to attend more integrated talks gave me a broader view of the relevance of my work.

Daniel Fazakerley, Department of Biology and Biochemistry, University of Bath

Spring 2008 Joint Meeting of the British Societies for Cell and Development Biology

31 March – 3 April 2008. Warwick University

For more details and registration information see www.bscb.org

Monday 31 March

Delegate registration	14:00 – 18:00	Rootes Social Building
Committee Meetings		
British Society for Developmental Biology	14:15 – 19:00	
British Society for Cell Biology	14:15 – 19:00	
Dinner	17:30 – 19:30	Rootes Restaurant
BSCB Garland Plenary Lecture Lenny Guarente	19:30 – 20:30	Main Theatre
BSDB Plenary Lecture Sean Carroll, Maddison, USA	20:30 – 21:30	Main Theatre

Tuesday 1 April

Session 1	**BSDB: Gene Networks and the Control of Gene Expression** Chair: Eileen Furlong (Main Theatre)	**BSCB: Modulation of genetic traits** Chair: Siegfried Hekimi (Cinema)
09:00 – 09:30	Eileen Furlong (Heidelberg, Germany)	Siegfried Hekimi (Canada)
09:30 – 09:45	Short talk	Short talk
09:45 – 10:15	Susan Mango (Utah, USA)	Mick Tuite (UK)
10:15 – 10:45	Refreshment Break (Mead Gallery)	
10:45 – 11:15	Greg Elgar (London, UK)	Amanda Fisher (MRC, London)
11:15 – 11:30	Short talk	Short talk
11:30 – 12:00	Peter Rigby (London, UK)	W.H. Irwin McLean (Dundee, UK)
12:00 – 14:00	Lunch & Poster Session (Mead Gallery) Workshop 'How to get your paper published' – Venue TBC	
Session 2	**Quantitative Analysis and Interpretation of Development Signals** Chair: Alfonso Martinez Arias (Cinema)	**BSCB: Traffic & Partitioning of Cells** Chair: Elizabeth Craig (Main Theatre)
14:00 – 14:30	Alfonso Martinez Arias (Cambridge, UK)	Elizabeth Craig (USA)
14:30 – 14:45	Short talk	Short talk
14:45 – 15:15	Sally Lowell (Edinburgh, UK)	Miguel Seabra (UK)
15:15 – 15:45	Refreshment Break (Mead Gallery)	
15:45 – 16:15	Naama Barkai (Rehovot, Israel)	Sandrine Humbert (Paris, France)
16:15 – 16:30	Short talk	Short talk
16:30 – 17:00	Jim Smith (Cambridge, UK)	David Ron (USA)

17:00 – 18:00	BSCB: Hooke Medal	
18:00 – 19:00	BSDB AGM	BSCB AGM
19:00 – 20:30	Dinner (Rootes Restaurant)	
20:30 – 21:30	Poster Session & Trade Exhibition Odd number posters 20:30-21:30 Even number posters 21:30-22:30 (Mead Gallery)	

Wednesday 2 April

Session 3	**BSDB: Regeneration and Repair** Chair: Margaret Buckingham (Main Theatre)	**BSCB: Problem Proteins & Autophagy** Chair: Chris Dobson (Cinema)
09:00 - 09:30	Margaret Buckingham (Paris, France)	Chris Dobson (UK)
09:30 – 09:45	Short talk	Short talk
09:45 – 10:15	Vassilis Pachnis (London, UK)	Richard Morimonto (USA)
10:15 – 10:45	Refreshment Break (Mead Gallery)	
10:45 – 11:15	Ben Scheres (Utrecht, Netherlands)	Ana Maria Cuervo (USA)
11:15 – 11:30	Short talk	Short talk
11:30 – 12:00	Alejandro Sanchez Alvarado (Utah, USA)	David Rubinsztein (UK)
12:00 – 14:00	Lunch (Mead Gallery) BSDB & BSCB Student Workshops (Rooms TBC)	

Session 4 (Cinema)	**BSDB: Cell Fusion in Development** Chair: Benjamin Podbilewicz (Main Theatre)	**BSCB: Modulation of Genetic Traits** Chair: Keith Gull
14:00 - 14:30	Benjamin Podbilewicz (Israel)	Keith Gull (UK)
14:30 – 15:00	Renate Renkawitz-Pohl (Marburg, Germany)	Takashi Toda (UK)
15:00 – 15:30	Refreshment Break (Mead Gallery)	
15:30 – 16:00	Masaru Okabe (Osaka, Japan)	15:30-15:45 Short talk 15:45-16:00 Short talk
16:00 – 16:30	Karl Swann (Cardiff, UK)	Phil Beales (UK)
16:30 – 17:00	BSDB Beddington Medal Talk: Elaine Fuchs (USA)	
17:15 – 18:15	BSDB Waddington Medal (Main Theatre)	
18:15 – 19:30	Poster Session (Mead Gallery)	
20:00 - Late	Conference Dinner (Panorama Suite)	

Thursday 3 April

Session 5	**BSDB: From Neuronal Identity to Circuit Formation** Chair: Martyn Goulding (Main Theatre)	**BSCB: Mechanical Signals & their Transduction** Chair: Donald Ingber (Cinema)
09:00 – 09:30	Martyn Goulding San Diego, USA	Donald Ingber (USA)
09:30 – 09:45	Short talk	Short talk
09:45 – 10:15	Bill Harris (Cambridge, UK)	Laura Mechesky (Glasgow, UK)
10:15 – 10:45	Refreshment Break (Mead Gallery)	
10:45 – 11:15	Stefan Thor (Linköping, Sweden)	Richard Treisman (CR-UK)
11:15 – 11:30	Short talk	Short talk
11:30 – 12:00	Siew-Lan Ang (London, UK)	Michael Sheetz (USA)
12:00 – 14:00	Lunch (Mead Gallery)	

CLOSE

Other forthcoming meetings

2007

Minerva - Weizmann Workshop
"Moving Cells - from Molecules to Animals"
November 24–28 2007
Rehovot, Israel
www.weizmann.ac.il/conferences/acma

Pancreatic beta cell: birth, life and death conference
St. Thomas Hospital, London
3–4 December 2007
This two day Focused Meeting is sponsored jointly by the Biochemical Society, Juvenile Diabetes Research Foundation (JDRF), and EU Consortium "SaveBeta".
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA080

Biochemical Society Annual Symposium - Structure and function in cell adhesion
5–7 December 2007
Manchester, UK
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA066
Email: meetings@biochemistry.org
Telephone: 020 7280 4150

Actin 2007
10 December
The Watershed, Bristol
Organized by Harry Mellor and Giles Cory
Contact actin-meeting@bristol.ac.uk
More information:
www.bristol.ac.uk/biochemistry/actin2007/

2008

Genetic Analysis: Model Organisms to Human Biology.
The Genetics Society of America
5–8January, 2008
San Diego, CA
Abstract deadline: 14 November, 2007

Molecular Basis for Biological Membrane Organization
Organizers: Kai Simons, Ira Mellman and Petra Schwille
January 12 - 17, 2008 • Big Sky Resort • Big Sky, Montana
www.keystonesymposia.org/

Execution and control of cytokinesis
Royal College of Surgeons, Edinburgh, UK
9 - 12 January 2008
A Biochemical Society Focused Meeting
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA069

RNA UK 2008
The Burnside Hotel, Cumbria, UK.
18–20 January 2008
www.biochemistry.org/meetings/programme.cfm?Meeting_No=IND26

31st Annual Meeting of the German Society for Cell Biology (DGZ)
12–15 March 2008
Marburg, Germany
www.zellbiologie.de

Plant Biology 2008
Mérida, Mexico
27 June – 2 July 2008
www.aspb.org/meetings/pb-2008/

33rd FEBS Congress & 11th IUBMB Conference
Athens, Greece
28 June – 3 July 2008
www.febs-iubmb-2008.org
Email: febs-iubmb2008@cnc.gr

ICHC2008
13th Congress of the International Federation of Societies for Histochemistry and Cytochemistry
August 23-27 2008
"Imaging Cell Dynamics"
Gdansk, Poland
www.ichc2008.org

ELSO, Nice, France
August 30 – September 02 2008
www.elso.org

ASCB 48th Annual Meeting
13–17 December, 2008,
San Francisco, CA
www.ascb.org

BSCB Autumn Meeting 2008

Epithelial Morphogenesis and Diseases
15–17 September 2008
University of Greenwich
Organizer: Vania Braga
(v.braga@imperial.ac.uk)

Sessions include:
- Stem Cells
- Tissue Specificity
- Patterning
- Morphogenesis
- Cell–Cell Adhesion
- Polarity
- Epithelial Diseases
- Epithelial Cancer

2009

ELSO 2009
September 2009
Amsterdam, Netherlands
www.elso.org

ASCB 49th Annual Meeting
5–9 December, 2009
San Diego, CA
www.ascb.org

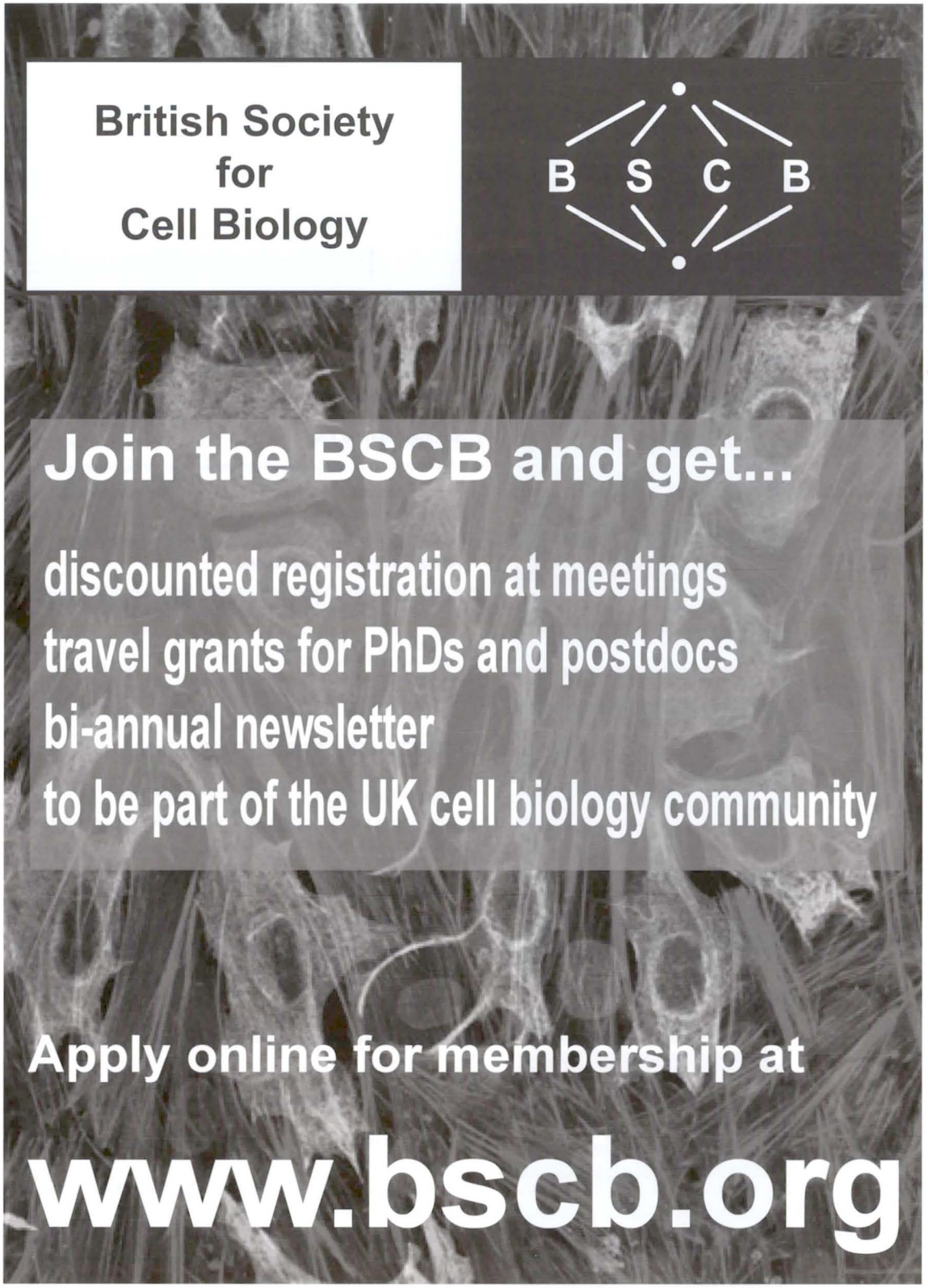
2010

14th International Congress of Immunology
Aug. 22-27, 2010
Kobe, Japan
http://www.ici2010.org/

September 2010
ELSO, Dresden, Germany
www.elso.org

2011

ELSO 2011
September 2011
Amsterdam, Netherlands
www.elso.org



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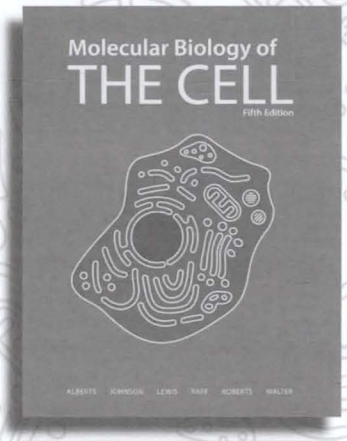

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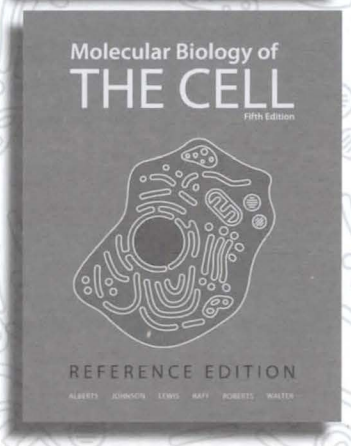

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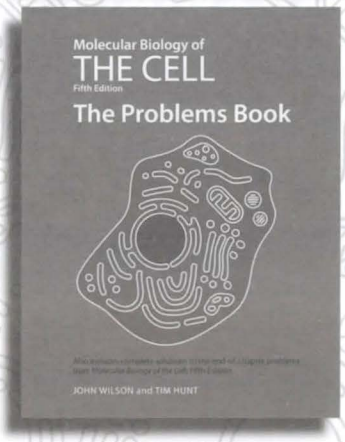

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Honor Fell Travel Awards

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

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

Signature: _____

Name: _____

Undergraduate bursaries to attend the 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 2008

BSCB President's report, 23 June 2007

It has been a busy year for the BSCB and in keeping with the interactive nature of modern cell biology, both our meetings this year were held jointly with other societies. For the autumn meeting we joined forces with the Royal Microscopical Society at Royal Holloway University of London to tackle "Imaging Membrane Dynamics: Visualization of Trafficking Pathways". We are very grateful to David Stephens from the BSCB and Rainer Duden from RMS for bringing together a stellar group of speakers.

At the annual Spring Meeting it was a three way show between the BSCB, the BSDB and the Genetics Society at Heriot-Watt University in Edinburgh. Sylvie Urbe and Angus Lamond worked tirelessly to organise the BSCB sessions and are to be congratulated for a very successful meeting. The Spring meeting also saw an increase in satellite events. Nic Tapon, Sally Wheatley and Adam West gave all their top tips on "Starting your own Lab" at a well attended lunchtime session and had to field a large number of questions from the audience. For those who want the 10 second sound bite – the "Top of Top Tips" was that anyone who wants go solo, whether it be by the fellowship or faculty position route, has to do their homework (decide what you want and where you want to do it), get out there (go to prospective future host institutions and talk to people) and realise that the process can take a long time (not dissimilar to buying and selling property in London). In addition, we saw the rise of student power. Last year the students organised a social event but this year they excelled themselves by repeating the social event, providing student T shirts and hosting their own lunchtime session of student talks. All of this made us realise that the BSCB was sorely lacking both a student and postdoc representative, and I am pleased to tell you that Katie Fisher (Oxford) and Jean-Pierre Eid (Postdoc at University College London) have recently been co-opted onto the BSCB committee. While on the topic of meetings, I would like to thank everyone who has been involved in the meetings whether they be programme organisers, speakers, poster presenters and delegates. Most of all, a very big thank you to Kairbaan Hodivala-Dilke, the BSCB meetings secretary, who yet again has worked so hard throughout the year.

The BSCB has seen a number of other changes this year. Although the website has yet to have its final launch, I hope that all of you who have logged on in the past month have admired its new look (including the smart new logo) and increased functionality. For that, a very big thank you Tony Ng and David Archer for their hard work in making this happen. This year we say goodbye to our outgoing treasurer Mark Marsh who has demonstrated a Gordon Brown-esque aptitude for managing our finances. Thankfully Mark has been training an able successor, Adrian Harwood. We also say farewell to Roy Quinlan who although leaving the committee will continue to be an important part of the BSCB as he is organising the 2008 Spring meeting. A warm welcome goes to our two new committee members, Dan Cutler (University College London) and Stella Hurtley (Science Magazine). We are grateful to all the organisations who generously sponsor our activities, in particular the Company of Biologists, who under-write our meetings and travel awards.

What is there to look forward to next year? First, I hope that you are able to participate in one, if not both, of the BSCB meetings that have been organised. They both promise to be exciting and fun events. Second, I am looking forward to having a student and postdoc representative on the committee. We want to have more input from our younger members and this is a good place to start. But, we need to go further, so please send in your suggestions as to what the BSCB should be doing. Continuing on this theme, I urge you all to help make the BSCB a society that represents all cell biologists in the UK. There are many exciting things that are happening in our field and we would love to hear about them either as suggestions for the newsletter or the new website.

Clare M. Isacke, London, June 2007

BSCB New members from April 2006

Abdelmotelb, A.A. Mahrous
Aghamohammadzadeh, Soheil
Ahmed, Shaheda
Alakakone, Bennett
Asano, Yukako Y.
Attanapola, Sheran L.
Bailey, Daniel J.
Barker, Amy
Bazou, Despina
Berglund, Fredrik
Birdsey, Dr. Graeme Miles
Butler, Claire
Caldeira-Fernandez, Joana
Camelo, Ana
Cannell, Ian
Canty, Dr. Elizabeth Gail
Chapman, Anna
Cheetha, Prof. Mike
Chen, Feng
Clutterbuck, Abigail L.
Collin, Joseph
Connell, Claire C.M.
Daniels, Matthew J.
Danquah, John Owusu
Dias, Prianthi
Doupe, David
Du, Wei
Duca, Edward
Dyer, Clare E.F.
Elcock, Lauren S.
Ewan, Richard
Fazakerley, Daniel
Ferreira, Claudia S.
Ferreira, Filipe J.F.
Ferreira, Rita
Fisher, Katherine H.
Fruhwirth, Gilbert O.
Furmonaviciene, Ruta
Garnett, James P.
Garside, Paul
Gerrard, Richie
Gibbins, Jonathan
Girdwood, David W.H.
Glover, James
Goldspink, Deborah
Gonzalez Bellido, Paloma T.
Grikscheit, Katharina
Grimsey Neil
Gururajarao, Shubha
Haines, Rebecca L.
Hartmuth, Sonya N.
Hayes, Sebastian D.
Heck, Dr. M.M.S.
Heinsbroek, Sigrid
Hosny, Neveen
Huang, Dr. Jun-Yong
Hughes, Helen
Iliescu, Florin Mircea
Ismail, Ayshe
Jarosz, Monika
Johnston, Simon
Jolly, Clare
Kaan, Timothy K.Y.
Keynton, Jennifer L.
Kirk, Semra
Koth, Jana
Kunda, Patricia E.
Leung, Louie H.Y.
Li, Bo
Li, Deyu
Lopes, Carla A. Mendes
Mansilla, Dr. Borja
Marshall, Kathryn M.
Martin, Jane S.
Marza, Esther
McCann , Rebecca
Mehta, Ishita S.
Mesmar, Joelle
Moss, Lara
Murphy, Jane
Na, Jie
Nightingale, Thomas
Norman, Mark J.
Odintsova, Elena
Ono, Motoharu
Orestis, Mavroudis-Chocholis
Peltan, Adam
Porter, Andrew P.
Purro, Dr. Silvia A.
Reynolds, John
Rezvanic, Zahra
Rich, Tina
Ridley, Dr A.
Ridout, Cheryl
Ritson, Sarah A.
Row, Dr. Paula E.
Ryan, Belinda J.
Sahores, Dr. Macarena M.
Sahota, Navdeep K.
Savoian, Matthew S.
Schmitz, Dr. Nicole M.R.
Shih, Yu-Huan
Singh, Sukhdeep
Smalley, Matt
Soncin, Francesca
Spensberger, Dominik
Straatman , Kornelis R.
Tanaka, Tomayuki
Teo, Regina M.M.
Trachoo, Objoon
Tsun, Andy
van Koningsbruggen, Silvana
Varndell, Ian M.
Villacis, Bolivar
Walrad, Pegine
Wardill, Trevor J.
Weight, Caroline M.
Wenham, Matt
Williams, Jennifer A.E.
Winter, Jennifer
Wodarski, Rachel
Wozniak, Marcin
Wright, Catherine S.
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BSCB Ambassadors 2007

The Society has representatives at each of the institutions listed below. The Ambassadors have agreed to promote Society activities and membership within their University or Institute.
They disseminate advertisements concerning future BSCB meetings, promote the advantages of membership, particularly to new PhD students, and are available to sign application forms and answer any BSCB-related questions. If your institute is not represented and you would be willing to become and ambassador, please contact Jonathan Pines.

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The BSCB newsletter is published twice a year.

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 can be in txt, rift or doc format. Please send images as 300dpi JPEG, TIFF or PSD files.
If images are for the front cover, please send as CMYK.

Submission of articles and images should be made to

Dr David Stephens
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Tel: 0117 928 7432
e-mail: david.stephens@bristol.ac.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.

Subscription information

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Regular member £25
Student, school teacher, retired member £10
UK resident members NOT paying by direct debit:
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Student, school teacher, retired member £15
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Regular member £25
Student, school teacher, retired member £10

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,
c/o The Company of Biologists Ltd.,
140 Cowley Road, Cambridge CB4 0DL
Email: bscb@biologists.com

Invoices: send to:

Dr Adrian Harwood
Cardiff School of Biosciences
Biomedical Building
Museum Avenue
Cardiff CF10 3US

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Single advertisement:
Back cover Black and White £275; Colour £425
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Full inside page, black and white only £220
$^1/_2$ Inside page, black and white only £110
$^1/_4$ Inside page, black and white only £55

Four advertisements, to cover two years. The costs are reduced by 30%.

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For further information on commercial advertising contact:
Margaret Clements, BSCB assistant,
c/o The Company of Biologists Ltd.,
140 Cowley Road, Cambridge CB4 0DL
Email: bscb@biologists.com

Journals

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.

Company of Biologists discounted prices:

- *Journal of Cell Science:* paper only £172/$295; online only £45/$77; paper and online £215/$365
- *Journal of Experimental Biology:* paper only £158/$270; online only £44/$75; paper and online £200/$340.
- *Development:* paper only £187/$325; online only £46/£80; paper and online £232/$400

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
The Anatomical Record	$150	*
BioEssays	$99	$160
Cell Motility and the Cytoskeleton	$150	$425
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:

- Print and online: $155 / EUR144
- Online only: $147 / EUR137

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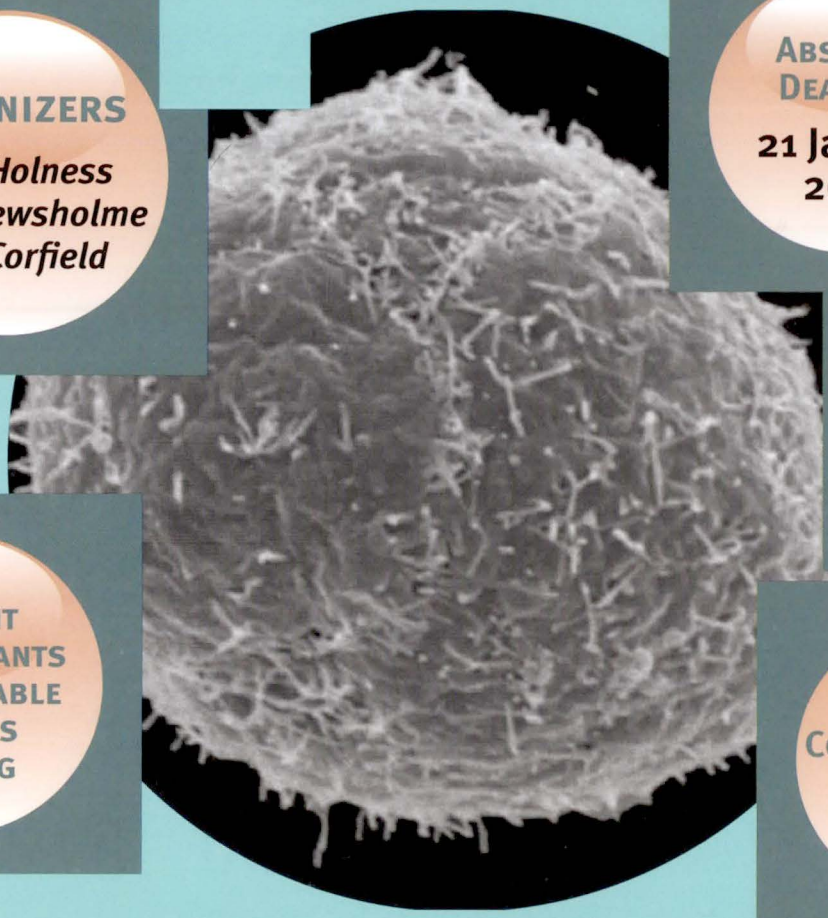
MOLECULAR MECHANISMS OF GLUCOLIPOTOXICITY IN DIABETES

UNIVERSITY COLLEGE DUBLIN, IRELAND
24–26 MARCH 2008



ORGANIZERS
Mark Holness
Philip Newsholme
Tony Corfield

ABSTRACT DEADLINE
21 January 2008

EARLYBIRD REGISTRATION
25 February 2008

STUDENT TRAVEL GRANTS ARE AVAILABLE FOR THIS MEETING

ORAL COMMUNICATION SPACES AVAILABLE

CONFIRMED SPEAKERS

Antonio Vidal-Puig
Gerry Hart
Hindrik Mulder
Jean Girard
Luigi Gnudi
Marc Donath
Mary Sugden
Miriam Cnop
Noel Morgan
Pierre Maechler
Vincent Poitout

Image kindly supplied by:
George Harb (University of Alberta, Canada)

TOPICS TO INCLUDE:

- β-cell lipases and insulin secretion
- Mitochondrial dysfunction in diabetes
- Nuclear receptors and nutrient-stimulated insulin secretion
- Protection from lipotoxicity in the pancreatic β-cell
- Regulation of the insulin gene by glucose and fatty acids

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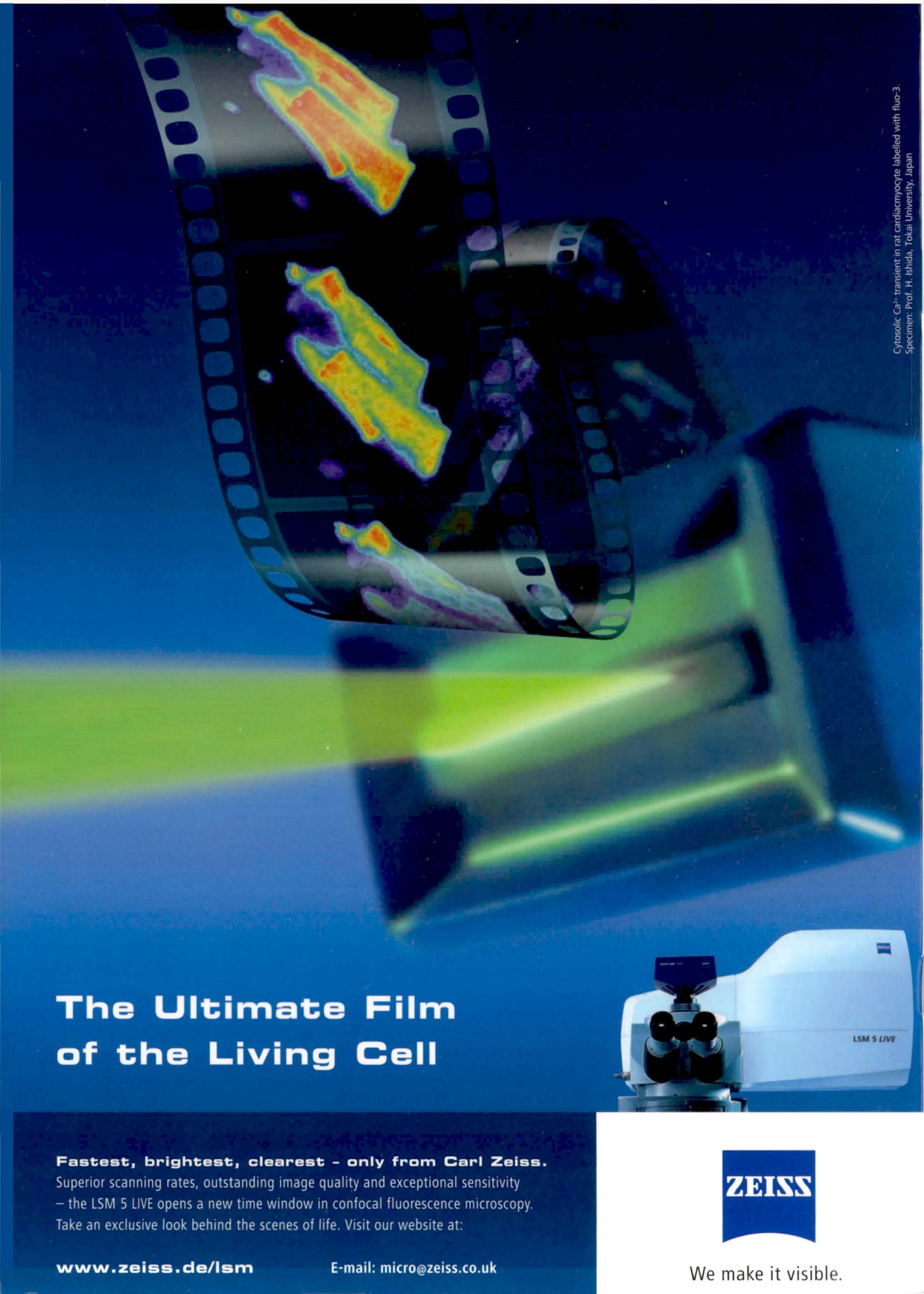

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