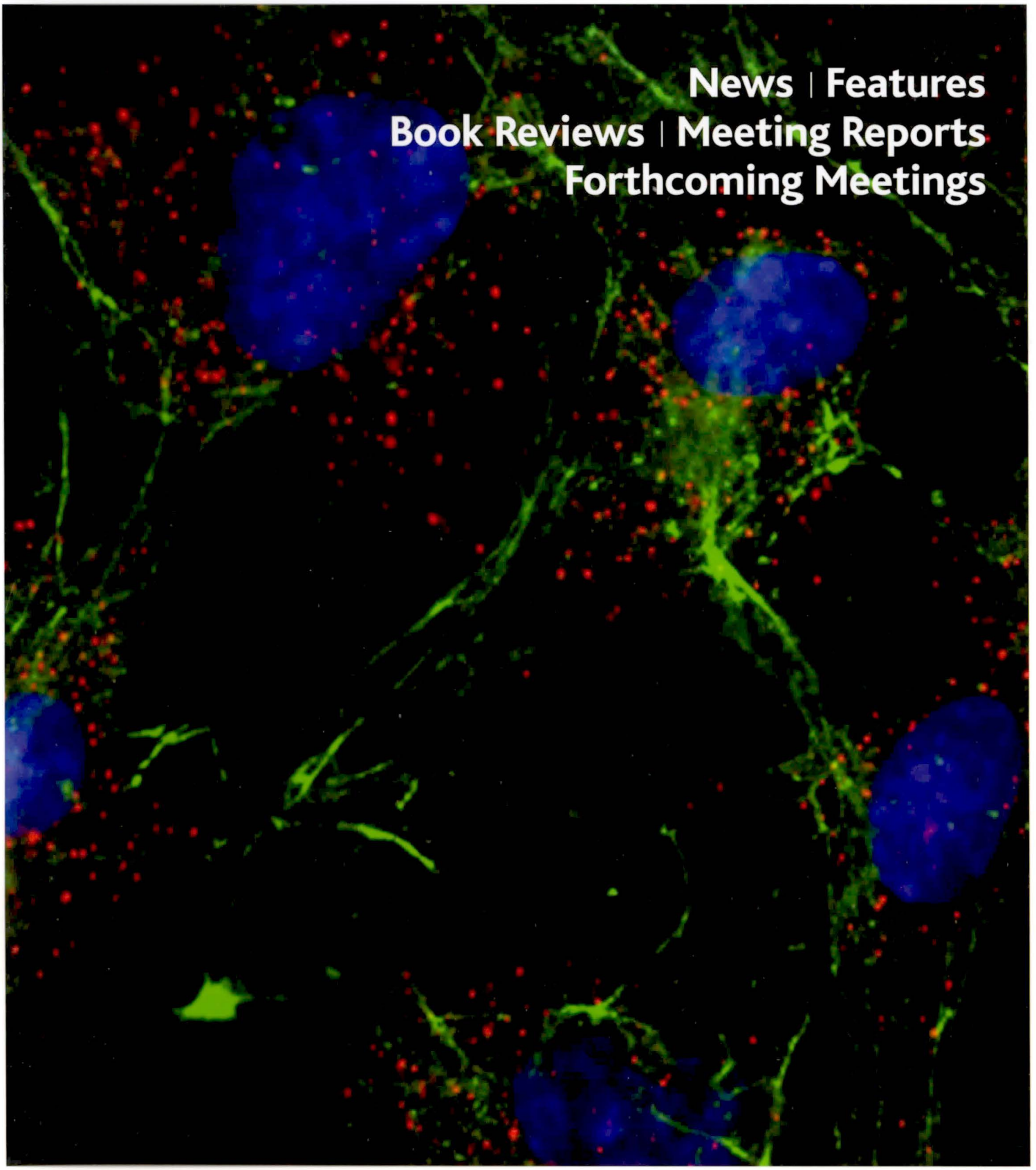
SPRING 2009

BSCB Newsletter

BRITISH SOCIETY FOR CELL BIOLOGY

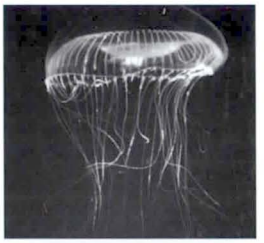


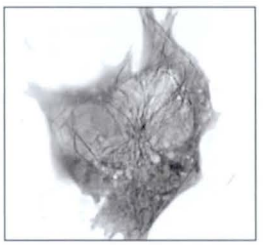
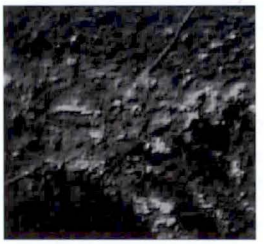
News | Features
Book Reviews | Meeting Reports
Forthcoming Meetings

SPRING 2009

BSCB Newsletter

CONTENTS

The cover image shows primary human fibroblasts labelled for collagen fibres (green), COPII (red) and DNA (blue). The image was produced by Anna Townley (University of Bristol) and featured in the opening of the Wolfson Bioimaging Facility at the University of Bristol, which is highlighted in the Features section.

Editorial

This newsletter should hit your desks just before the 2009 Spring meeting. The year sees the first formal link up with the Biochemical Society to bring you a major meeting. The theme of the meeting is The Dynamic Cell and certainly the line up of speakers promises great things. The meeting will also include the usual mix of BSCB events including a student social and other postdoc events. Your two new reps, Veronika Ganeva and Sarah McClelland respectively are organizing these and should serve as your point of contact for all matters relating to student or postdoc matters.

The Autumn Meeting this year is also a link-up with another society, in this case the International Society for Developmental Biology. This huge meeting, also in Edinburgh this year, will feature a specific session organized by the BSCB as well as a sponsored Plenary lecture. The speaker schedule for this meeting is quite amazing and we envisage that many cell biologists would be in attendance anyway but for these of you who might not have considered it this could be a great meeting to broaden horizons into the developmental biology arena.

This newsletter also contains a broad mix, including features on the opening of the Bristol Bioimaging Facility in Bristol as well as the first winner of the BSCB Science Writing Prize. This issue also features the first reports from the BSCB summer students, undergraduates who spent time in members' labs last year. Both schemes will run again this year – the details of the summer studentships are already on the website. Full details of the 2010 Science Writing Competition will be announced in the next newsletter.

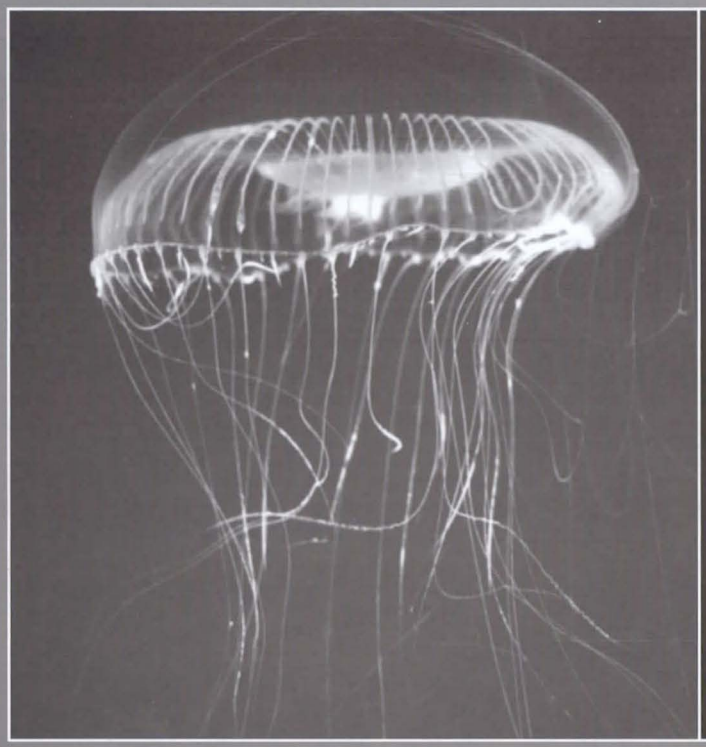
Jay Stone continues his contributions to the PhD student section; should any of you wish to contribute to the newsletter or have ideas for future content that might be of interest to the society then please contact the editor. In the meantime, enjoy this issue and we hope to see of many as you as possible at the Spring meeting.

The Editor: David Stephens
University of Bristol
david.stephens@bristol.ac.uk

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

News

Illuminating cell biology



The 2008 Nobel Prize in Chemistry was awarded jointly to Osamu Shimomura, Martin Chalfie, and Roger Tsien for the discovery and application of green fluorescent protein (GFP).

As you are all probably aware, our ability to exploit GFP has revolutionized cell biology. Shimomura purified GFP in the 1960s after harvesting literally hundreds of thousands of jellyfish from the Pacific Ocean. Chalife realized its potential and when the gene was cloned by Doug Prasher, he quickly moved to express this in other organisms, first *E. coli*, then *C. elegans,* which marked the dawn of a new era of molecular cell biology in which one could readily visualize cells, organelles and even individual proteins *in situ*, in living cells and tissues without the need for any further intervention to generate fluorescence.

The more recent characterization of other colour variants, either through mutation of the original GFP or through cloning of new proteins from species such as reef corals, has facilitated the use of this technology in a much wider way. This has resulted in the generation of biosensors to detect acute changes in biochemical pathways, photoactivateable forms to act as fluorescent highlighters, destabilized and differentially maturing forms to act as fluorescent timers.

Other developments have included the derivation of fluorescent biosensors either based on fluorescence resonance energy transfer (FRET) or direct binding of ligand (such as phosphoinositide binding domains), variants tailored for super-resolution microscopy (chosen by *Nature Methods* as the 2008 "Method of the Year"), split variants for protein interaction studies, and a full palette of colour variants for multiplex analyses of gene function *in vivo*. These tools enable a truly astounding array of tools to probe the spatial and temporal state of almost any process in cells, tissues, and even whole organisms.

It is almost impossible to convey the magnitude of the transformation of cell biology research that has resulted from the development of GFP technology and the recognition afforded by the Nobel Prize is a worthy reward. It seems unnecessary to provide an exhaustive review here and the reader is referred to other excellent resources for further information.

Most readers will probably know the story of GFP but for those who do not a free Primer on GFP technology is available from Nature Chemical Biology: www.nature.com/nchembio/journal/v5/n2/pdf/nchb-primer001.pdf

An extended essay by Shimomura on his career and work on the jellyfish *Aequorea victoria* published in the Journal of Microscopy following his award of the Royal Microscopical Society Pearse Prize: www3.interscience.wiley.com/journal/118735598/abstract

Full details of the award of the 2008 Nobel Prize and many excellent resources and interviews with Shimomura, Tsien, and Chalfie can be found on the Nobel Committee website at: nobelprize.org/nobel_prizes chemistry/laureates/2008/index.html

The beautiful image of *Aequorea victoria* was kindly provided by Kevin Kemmerer. Also shown is a rendered image of the crystal structure of GFP kindly produced by Richard Sessions (University of Bristol).

BSCB Membership subscriptions

The Society's finances continue to be strong, and we offer members a range of deals, including discounts for books, journals and BSCB sponsored meetings. We hold Spring and Autumn meetings, support a range of activities that include the Honor Fell Travel Awards, sponsorship of scientific conferences and, for the first time this year, undergraduate Summer Vacation Studentships.

We will continue to expand and develop these activities; however it is necessary to plan for increased future expenditure. As a consequence it was agree at the last AGM to increase the annual membership subscriptions in 2009.

Currently, these are £25/yr for regular member and £10/yr for student/retired or school members. These will be increased to £35/yr and £15/yr respectively, an amount comparable to other societies. These will be collected during 2009. For current members, we plan to collect these in spring.

Can I remind you that you can check your or payment and bank account details on the member's database. If you change your bank details you will need to send a new Direct Debit mandate to Margaret Clements (bscb@biologists.com).

Adrian J Harwood (Treasurer)

New BSCB Committee members...

Several changes have recently occurred to the BSCB committee. Jon Pines has stepped down as Membership Secretary to be replaced by Dan Cutler, Richard Grose has joined as sponsorship secretary, Paul Andrews has replaced Tony Ng as website coordinator, and Andrew McAinsh is shortly to take over from Kebs Hodivala-Dilke as meetings secretary.

We owe a huge debt of gratitude to Kebs, Jon, and Tony for their huge amount of effort towards the smooth running of the society. The full list of committee members along with their contact details can be found on the BSCB website www.bscb.org.

... and new representatives for PhD students and postdocs

The BSCB Committee has two new additions to its committee. Veronika Ganeva joins as PhD student representative and Sarah McClelland joins as postdoc representative.

Veronika is currently a PhD student in Stem Cell and Developmental Biology at the University of Edinburgh who is working on the differentiation of embryonic stem cells during kidney development. Sarah is a postdoc in Andrew McAinsh's lab at the Marie Curie Research Institute in Surrey working on chromosome segregation.

Veronika and Sarah are your contacts for student and postdoc matters. They are the ones who organize the workshops and socials at the Spring meeting and contribute to the organization of other meetings and society business. If there is something that you think BSCB should be doing for you as student or postdoc members than do get in touch with them.

A new Society for Biology

In 2008 a merger was agreed between two existing bodies that provide a voice for biological and biomedical sciences in the UK.

The Institute of Biology and Biosciences Federation agreed to merge their activities to form a new organization providing a voice for Biology within the UK. The aim is to provide a similar organization to that in other disciplines, such as the Royal Society for Chemistry and Institute of Physics. Both are large scale organizations providing a platform for those disciplines on a national and international stage.

Such a level of organization has largely been missing from the biology community with no coherent voice linking closely related disciplines.

The stated vision of the new organization is to "represent all who are committed to biological practice, education and research, to facilitate the promotion and translation of advances in biological science for national and international benefit, and to help the wider public to engage with our subject".

Further details on the structure and organization of the new body will emerge throughout 2009; ongoing developments can be followed on the websites of either the Biosciences Federation (www.bsf.ac.uk) or the Institute of Biology (www.iob.org).

From ELSO to EMBO

THE EMBO MEETING 2009: AMSTERDAM, 29 AUGUST TO 1 SEPTEMBER

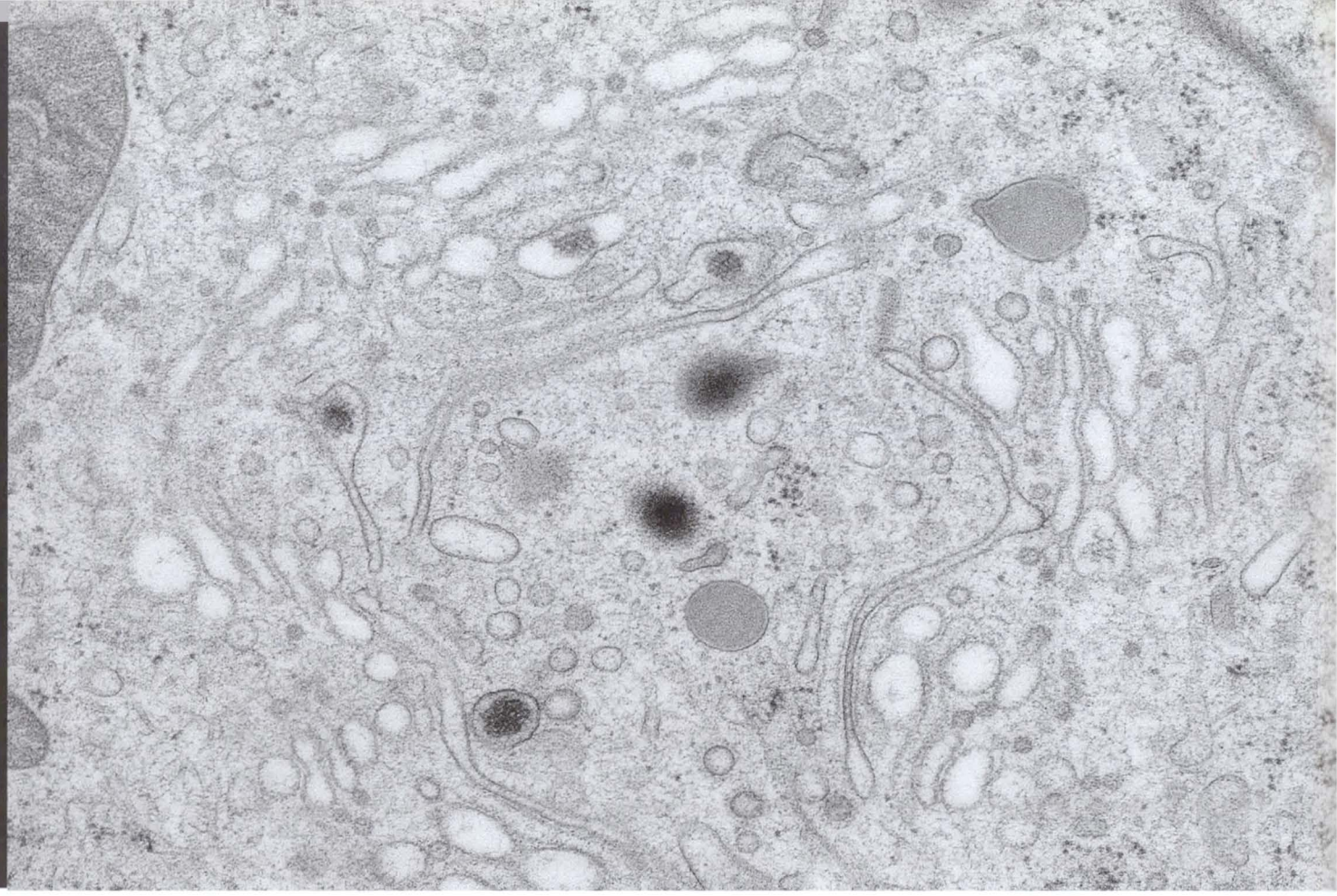
A mainstay of European life sciences conferences for the past decade or so have been the ELSO meetings. These brought together life scientists, principally cell biologists, from across Europe. Now, these meetings have been taken over by a new annual EMBO Meeting which is aimed at a similar audience although perhaps with a broader emphasis on life science than ELSO. The first meeting, to be held in Amsterdam, includes a scientific programme put together by Hans Clevers and Steve West, who are the co-chairs of the event.

Highlights include:

- **Professor Martin Rees** (Cambridge University), Astronomer Royal, cosmologist and astrophysicist, will expand our horizons beyond the life sciences
- **Ronald Plasterk**, Minister of Education, Culture and Science in The Netherlands, former molecular geneticist and media columnist, will inform us on current issues in science policy
- **Professor Harald zur Hausen**, EMBO Member and winner of The Nobel Prize in Physiology or Medicine 2008, will tell of his discovery that human papilloma viruses cause cervical cancer
- **Svante Pääbo**, Director at the Max-Planck Institute for Evolutionary Anthropology, will discuss molecular analyses of the Neanderthal genome

Important dates are:
Abstract submission: 25 April
Early registration: 25 April
Hotel booking: 29 May
Late registration: 14 August

www.the-embo-meeting.org



The Wolfson Bioimaging Facility, University of Bristol: A new integrated light and electron microscopy facility

University of BRISTOL 2009 CENTENARY GREAT PAST ~ GREATER FUTURE

With the establishment of a new Bioimaging Facility in the School of Medical Sciences a long-held wish has come true for Bristol cell biologists and life science researchers in general. The Facility has a suite of cutting edge light and electron microscopes side by side and aims at fully integrating the 2 modalities to support state of the art microscopy based research. The official opening took place on June 20, 2008 and the scientific opening was celebrated by a scientific symposium on January 8, 2009 to highlight the new possibilities in the Facility.

The University of Bristol MRC Cell Imaging Facility was founded in 1996 within the School of Medical Sciences (SoMS) as a central light microscopy Facility for all departments within SoMS and more widely for the biology and biomedical science researchers in neighboring faculties, clinical units, and teaching hospitals. It acquired the latest and best confocal and wide field microscopes and under the management of Mark Jepson has for more than 10 years provided an exceptional platform for many life science researchers from the Bristol area to obtain access to high-end light microscopes. A small electron microscopy unit headed by David Woolley had been running even longer within the Department of Physiology in SoMS. Although both

units had been running very successfully over the years there was an increasing demand to have both modalities closer together and functioning as one unit.

This wish has recently turned reality with the help of substantial financial support from the Wolfson Foundation, the Medical Research Council (MRC), and the University of Bristol. With a total capital investment of £2.3 million, the existing Cell Imaging Facility was greatly expanded, and the EM unit was moved into the same area of the SoMS as the Cell Imaging Facility. This coincided with the recruitment of Paul Verkade from the Max Planck Institute for Cell Biology and Genetics in Dresden who heads the EM side of the new Facility. Paul joins Mark who has led the Cell Imaging Facility in Bristol since its inception in 1996 and was therefore ideally placed to coordinate the selection, installation, and application of the new imaging technologies.

The development was also aided greatly by the contributions from Leica Microsystems, FEI Company, and Improvision/Perkin Elmer. With a total refurbishment time of approximately 18 months, it has created a fully integrated Bioimaging Facility with light and electron microscope rooms side by side.

Thanks to the very generous support of the Wolfson Foundation, the new Facility was termed "**Wolfson Bioimaging Facility**". To celebrate this, the Facility was officially opened with a small ceremony on June 20, 2008 by Mr. Paul Ramsbottom from the Wolfson Foundation. Such a new development and new opportunities for life science researchers from the South West however deserved a wider audience.

In order to highlight these new possibilities, a Scientific Opening Symposium was organized on January 8, 2009. The official opening of this symposium was performed by the Vice-Chancellor of the University of Bristol Eric Thomas. He highlighted the importance of such state of the art imaging facilities for the success of Cell Biology research in Bristol. Visitors were also treated to tours of the new labs including demonstrations of the new technologies available.

New technology at the Wolfson Bioimaging Facility

Over the years, the Light Microscopy Unit of the Wolfson Bioimaging Facility has been used for a large amount of live cell imaging both on wide-field as confocal systems. The latest additions to the light microscopy arm of the Facility include a Leica SP5 confocal microscope and a Perkin Elmer Ultraview spinning disk confocal microscope. Both are high end systems with the latest imaging technology and their own unique possibilities. Whereas the SP5 is very powerful in acquiring high-resolution z-stacks with excellent sensitivity, the spinning disk system is more suited for fast live cell imaging of cultured cells. Both systems incorporate the ability to perform dynamic photobleaching experiments as well as being ideally suited for both rapid and longer term imaging of living cells. In addition to these confocal microscopes, the Facility has also installed a Leica multi-channel TIRF system which will be of particular benefit to those studying events at or near the plasma membrane such as endocytosis and secretion.

The invited scientific speakers of the opening symposium each highlighted one aspect of each of the new imaging modalities now available in Bristol. First of those was Kees Weijer from the University of Dundee who showed what is possible using live cell imaging. He has been studying chemotactic cell movements during *Dictyostelium* aggregation and chick embryo gastrulation. His beautiful movies were supported by powerful analysis of the data which, coupled with the use of modeling, made this a very convincing synergy.

As highlighted by Kees Weijer in his talk, an ever more important part of an imaging experiment is the data analysis. Within the Facility, a dedicated data analysis suite has been set up with off-line work stations for both light and electron microscopy data analysis. This data analysis room has also been made suitable for teaching sessions to train small groups of undergraduate and postgraduate students or specialized seminars. The addition of these new microscopes ensures that Bristol's light microscopy facilities continue to excel as they have done for the past decade.

Werner Kühlbrandt from the Max Planck Institute for Biophysics in Frankfurt, Germany gave an excellent overview of the state of Cryo Electron Microscopy (EM). Nowadays one can achieve sub-nanometre resolution of single particles in a cryo-electron microscope but it is also possible to visualize cellular organelles in a completely frozen hydrated state even in combination with electron tomography, the 3D method for EM. The latest developments within Werner Kühlbrandt's group aim at even further improving the resolution in cryo EM. Cryo EM is a completely new area for researchers in Bristol but with the installment of a 200kV FEI Tecnai 20 Transmission EM (TEM) with a cryoholder and cryopreparation equipment the necessary tools are there to acquire medium resolution data. These data can then be used for further refinement of the model or subsequent acquisition of high-resolution data at a dedicated center such as is to be established in a national high-resolution electron microscopy Facility.

The role of Total Internal Reflection Microscopy, another of the new imaging modes acquired for the new Facility, was beautifully highlighted by Anna Akhmanova, Erasmus University, Rotterdam, The Netherlands. She gave a fantastic overview of what TIRF can be used for. Her work showcased this

From top: Paul Verkade and Mark Jepson, who lead the facility; Paul Ramsbottom from the Wolfson Foundation opening the facility in June 2008; Eric Thomas, Vice-Chancellor of the University of Bristol, speaking at the Scientific Opening Symposium in January 2009; visitors to the facility being shown the new technologies available.

technology for the study of microtubule dynamics and membrane trafficking. In addition her talk provided a fantastic illustration of the power of live cell imaging in general, revealing key data in terms of cell dynamics that one simply cannot obtained from analysis of fixed samples.

Judith Klumperman from the University of Utrecht, The Netherlands highlighted the significance of having both light and electron microscopy facilities side by side. Her research focuses on the function of lysosomes and its importance in human disease. To study this function she uses a combination of live cell imaging, immunogold labeling for electron microscopy, and Correlative Light Electron Microscopy (CLEM), a technique where it is essential to have both modalities in close proximity. The new Facility includes all of the necessary tools for such high-end EM work including an EMPACT2 high pressure freezer, rapid transfer system, and freeze substitution system. The Facility also includes a dedicated cryo-ultra microtome within a low humidity cryosectioning room.

These senior internationally renowned speakers were mixed with two young Bristol scientists' highlighting the research they had already performed within the Bioimaging Facility.

First up was Jonathan Astin from Kate Nobes' lab. Using live cell imaging he showed the involvement of ephrins and eph receptors in repulsion (and attraction) in cancer cells. Anna Townley from David Stephens' lab studied the role of the COPII complex in the export of procollagen from the ER. In an elegant study she used almost all the available imaging techniques (including standard immunofluorescence, live cell imaging, photobleaching, high-pressure freezing, transmission and scanning electron microscopy) in the Facility to study the function of COPII in this pathway. In addition she not only used a cell culture system for these studies but developed her research in zebrafish to validate her findings in an *in vivo* model. The cover image of this issue shows a wide-field micrograph of primary human fibroblasts labeled for collagen (green) and COPII (red) which forms part of this work.

Conventional imaging

As well as the newer techniques highlighted during the symposium the Facility offers a wide range of more conventional imaging possibilities. The **Light Microscopy Unit** now houses a total 9 microscopes of which 5 are confocal based and 4 are wide field based (including the TIRF system which can also be used as a very good wide field imaging microscope). These systems are widely used by users across the University for imaging of processes from bacterial invasion to cancer cell migration.

Besides the high-end high pressure freezing and other cryo fixation techniques for CLEM, electron tomography and cryo electron microscopy, the **Electron Microscopy Unit** also offers standard fixation and preparation techniques for scanning and transmission electron microscopy. To this end a new FEI Tecnai 12 Biotwin Transmission Electron Microscope and a Quanta 400 Scanning Electron Microscope have been acquired in addition to the 200kV FEI Tecnai 20 TEM. The latter is also configured as a scanning transmission electron microscope (STEM) with a detector for High Angle Annular Dark Field (HAADF) to detect heavy metal particles more easily. An example image from this mode is shown opposite.

Training at the Facility

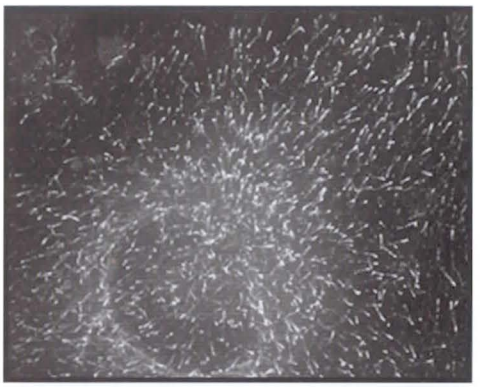
The development of the new Facility has already proven to be a massive benefit to many researchers in Bristol, notably the cell biology community. Key to the success of this Facility is the excellent training provided by Mark, Paul and their colleagues.

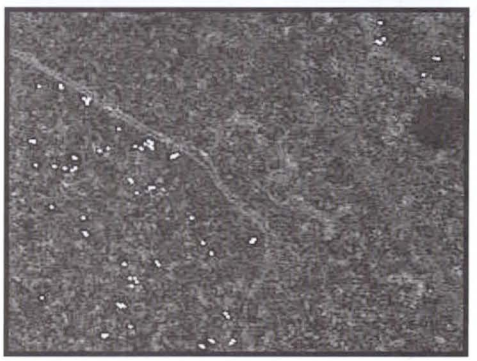
The new Bioimaging Facility is also at the core of two new postgraduate research programmes within the Faculty; a Wellcome 4 year PhD Programme in "Dynamic Cell Biology", headed by Paul Martin and Pete Cullen is already underway with the first cohort of students making good use of the new Facility straight away. In addition, a group of 11 cell biologists, headed by Jon Lane, has been awarded 6 capacity building studentships by the MRC to fully exploit these new developments. The theme of these studentships is "Quantitative Imaging of Cellular Dynamics" which also highlights the increasing role of biophysics, engineering, and mathematics in the analysis of light and electron microscopy data to fully exploit the potential of these approaches.

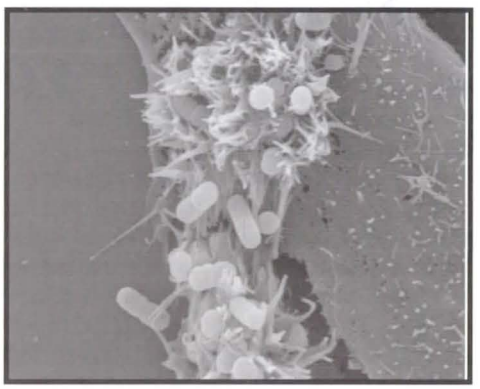
The Wolfson Bioimaging Facility is ideally placed for this integrated approach with many key biophysicists within the SoMS and the departments of Mathematics, Engineering, and Physics within a short distance on the precinct. The continued investment in the Facility ensures that it will remain at the heart of cell biology research in Bristol.

The images included in this article provide examples from the imaging work ongoing at Bristol (kindly provided by Mark Jepson, David Stephens, and Paul Verkade). Further details on the Facility can be obtained from either Mark Jepson or Paul Verkade.

www.bris.ac.uk/biochemistry/wbif







From top: 3D, deconvolved image of microtubule plus ends and endoplasmic reticulum exit sites; image of a bacterium invading and epithelial cell; HAADF-STEM image of 10 nm immunogold labelling of a nuclear protein showing the very high contrast of the gold particles; SEM of *E. coli* induced filopodia on HeLa cells (from Kenny et al. Mol. Microbiol. 44:1095-1107 (2002) © Blackwell Publishing

2009 BSCB Science Writing Prize: 'Untangling the String'

We are very pleased to announce Emily Pritchard as the winner of the 2009 BSCB Science Writing Prize. Her essay, "Untangling the String" was judged to be the winner by Tim Radford, a freelance science writer and former science editor of *The Guardian* newspaper. Emily completed her undergraduate degree in Genetics in 2006 at the University of Edinburgh. She then enrolled in the Masters by Research programme at the MRC Human Genetics Unit. This led to a PhD place in the lab of Professor Wendy Bickmore where Emily is currently in the second year of her PhD working on chromatin condensation in Cornelia de Lange Syndrome.

Human DNA is long, really really long. 2m long, in fact. 2m of this string-like polymer is found the nucleus of every human cell. The thing is, human cell nuclei are pretty tiny, only 20μm in diameter (that's only 1/50th of a millimetre). This means that that 2m of string is tangled and knotted up into nuclei so small, that over 100,000 of them can fit into the eye of a needle.

On that 2m of DNA are 20,000 genes; they all need to be switched on and off at different times and at different levels (like turning a dimmer switch up and down). But DNA doesn't just contain genes. Some of it has special sequences to control the genes, changing the level of the dimmer switch. Some of it contains parasitic sequences, often derived from viruses, that hijack the cell's machinery to copy themselves within and between genomes. Some of it is just rubbish, repetitive nonsense that doesn't do anything. So proteins need to navigate this, find the genes they need and the sequences that will help switch them on. Finding them is like being given a road atlas to the UK and being asked to find Finkleton Street. But nobody's told you what town Finkleton Street is in, or even what region. Plus they've mixed up all the pages of the map, shoved in some extra pages – some of which are just nonsense and others intentional red herrings. And they've helpfully removed the index.

Sounds like total chaos. Fortunately DNA is not a tangled ball of string. It's folded and twisted in a precise way, allowing chunks to come into contact with one another or with specific proteins, keeping high level genes (for that tissue or developmental stage) in areas with lots of activating proteins, and keeping low-level genes, junk DNA and parasites concealed so they're not switched on by accident. So first the DNA is wound around beads, then curled around and looped together, then held in specific regions of the nucleus. Now you can find Finkleton Street much quicker, you know the region it might be in, what it might have nearby and there's no rubbish to distract you. However this status is completely dynamic, continually altering to allow different genes to be switched on over time and in response to stimuli.

We know that the spatial organisation of DNA in the nucleus is vital for genes to be controlled correctly. It's less clear how this organisation occurs, and how this is able to affect specific genes. I'm looking at a set of proteins called cohesins, that are involved in DNA organisation. I'm studying what happens in a cell when cohesins are altered.

It is clear that there are problems when cohesins are altered. Cornelia de Lange Syndrome (CdLS) is a disease caused by mutation of the genes for cohesins. Patients suffer from abnormal arms and faces, behavioural problems, autistic-like learning difficulties, gastrointestinal reflux, seizures, hirsutism, heart defects, vision defects and slow growth. A mixture of seemingly unrelated symptoms, like this, is what we expect when control of gene switches goes awry.

I want to know why altering cohesins leads to such huge problems. I believe that DNA organisation is less tightly controlled in cells of CdLS patients than in healthy cells. This means that genes do not come into contact with the correct DNA sequences or proteins that would normally switch them on and off at the right time. Looking at nuclei down the microscope, I have seen that DNA in CdLS cells is packaged differently to that in healthy cells, especially in regions where we know cohesins bind to DNA. I would like to find out how DNA is held in place by cohesins, and what regions of the genome are affected by it.

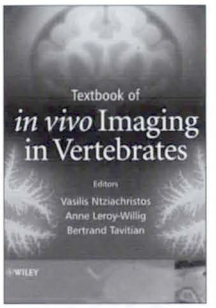
Cohesins were a group of proteins that were always known to be important in cell division. Before cells divide, they have to make copies of the DNA, and the copies of DNA are held together by lots of protein rings until the right time. These loops are made of cohesins. When the cell divides, an enzyme chops the cohesin rings, and the two copies of the DNA are allowed to come apart. We think that, as well as holding copies of DNA together after it replicates, cohesin may also hold loops of DNA together, allowing genes to be switched on simultaneously.

I doubt we will cure CdLS. As it doesn't normally run in families, doctors are unlikely to test for it prenatally, yet the prenatal damage is too severe to be remedied after birth. However our understanding of how cohesin contributes to DNA organisation will provide insight into many other diseases, diseases that we have more possibility of fighting, including cancers. If we can fully appreciate the factors that switch genes on and off, we can better predict the effects of drugs, gene mutation and gene therapy.

The publication of the Human Genome Sequence was supposed to unlock all sorts of mysteries, but in some ways it has created many more. Each cell is carrying this huge mass of information, which somehow needs to be read and processed. For now all we have is a map, but we don't know how to read it. To read it properly, we must first untangle the string.

Emily Pritchard, MRC Human Genetics Unit, Western General Hospital, Edinburgh.

Book Reviews



Textbook of in vivo imaging in vertebrates
Editors:
V. Ntziachristos,
A. Leroy-Willig,
B. Travitian
Wiley & Sons, 2007
ISBN:
978-0-470-01528-5

Textbook of *in vivo* imaging in vertebrates

EDITORS: V. NTZIACHRISTOS, A. LEROY-WILLIG, B. TRAVITIAN

"The observer becomes part of the observed system" (Heisenberg's Uncertainty Principle).

In other words, observing a system is going to change it. This is long known in physics but equally true for most of biology. As biological questions are getting increasingly complex, imaging their answers in a convincing way is getting more and more challenging. Scientists – in particular those, who investigate whole organisms and / or physiological problems – face the problem of interfering with the system simply by studying it in a fixed and therefore an artificial state. Consequently, the requirement to provide answers in a physiological context is growing, and in living animals this enforces the need to create new methods or adjust and apply them in new ways.

This book, as stated in the preface, intends to summarise the wealth of imaging technologies and applications of *in vivo* imaging and serve as a reference for biologists and biomedical researchers. It is the first time this topic is addressed in a comprehensive way and, in this sense at least, this book is certainly one that has been missing on the shelf.

The editors roughly divided the book in three parts to cover the whole topic. First, the basic physical principles of imaging techniques are explained; introducing ultrasound, MRI, X-ray, in vivo radiotracer and optical imaging techniques, for example with pros and cons as well as technical limitations. There is a big emphasis on NMRI in various modalities – which is probably one of the best chapters in the book. Each section starts with a take-home-message and then goes more into detail so it is down to the reader how much information to get out of a given paragraph. Unfortunately, this form is not kept for all parts of the book. All authors have different styles and layouts making it not easy for the reader to get a quick answer for a given question. In combination with a not particularly detailed content list (it does not give any information on the depth of paragraphs and not all chapters are divided up in the same way), taking this book as a reference can be more time consuming than expected. A very informative overview of new developments like multi-modality imaging, use of contrast agents and radiotracers then leads onto the second part of the book. Here, biological applications of *in vivo* or at least *in situ* imaging are split and described per tissue (brain, tumour, heart and muscle) with imaging parameters and protocols for each example. The last quarter of the book is describing two domains of research which have greatly benefited by *in vivo* imaging.

In general, all chapters go from quite basic to more detailed, including extensive maths (optical imaging, for example) and it is down to the reader to make use of it. Graphics, examples and images are always appropriate and easy to understand. The only disadvantage is the content list and varying division of chapters making the information a little more difficult to access than it could be – in particular since the intention was to provide a reference text. If one is prepared to invest a little more time, the book provides a great overview and also introduced the vocabulary for each technique, facilitating the next chat to a collaborator. Overall, a comprehensive book on imaging techniques is much needed and certainly valuable for many researchers now.

Katy Schmidt
University of Bristol

Books for review

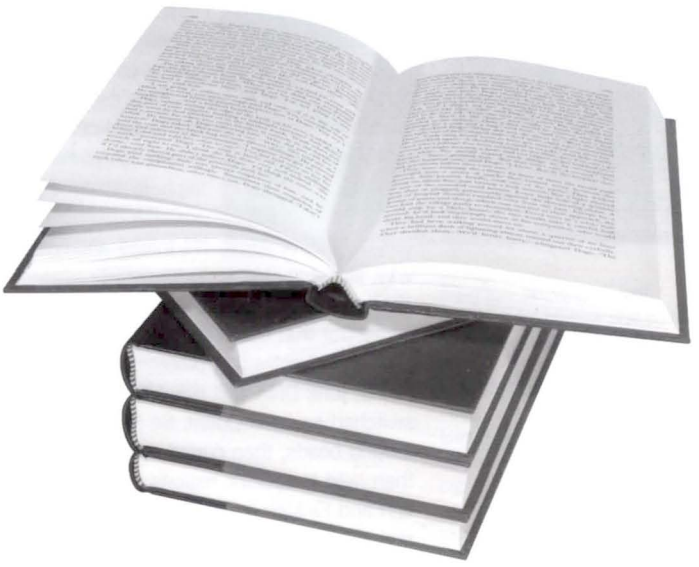
We are currently seeking a new coordinator for our book reviews. Joan Marsh has undertaken this task despite stepping down from the newsletter and we are very grateful to her for her ongoing input in to the newsletter. The role should be relatively simple, co-ordinating with publishers and liaising with potential reviewers to solicit and ensure the quality of reviews of books in any area of relevance to cell biology. Ideally, the person should be UK-based and be willing to provide reviews themselves of the most pertinent volumes in their own area. Should you be interested in assisting us in this role please contact the Newsletter editor.

Potential reviewers: We are always seeking potential reviewers for relevant books and those interested in reviewing books on our list, or others that they think might be relevant are welcome to contact the Newsletter editor.

Publishers: If you have relevant volumes that you would like reviewed by active members of the cell biology community then please do contact the Newsletter editor to arrange a list of potential books to be reviewed.

The list of books for review will be updated for the next issue of the newsletter.

Contact the newsletter editor: David Stephens,
david.stephens@bristol.ac.uk



Meeting Reports

5th International Symposium in Serpin Biology, Structure and Function

12–16 July; Leuven, Belgium

The 5th International Symposium in Serpin Biology, Structure and Function was held at the beautiful faculty club in the heart of Leuven in the Groot Begijnhof. The Groot Begijnhof has the appearance of a small town within the city of Leuven. It consists of a succession of streets, squares, gardens and parks with houses and convents in traditional brick and sandstone style. The Catholic University of Leuven purchased the site in 1962 and restored the town; today it houses the students and staff of the University.

The conference comprised 49 talks split into ten sessions and two poster sessions spread over five days. The subject area was very focused with 127 delegates attending. Scientists travelled from around the world to be there, including America, Japan, Australia, Austria and the UK.

During the conference there were ten sessions including, a focus on PAI-1, Therapeutic Targeting of Serpins, Pathobiology of the Serpinopathies and Serpins and Cancer. Of particular interest to me were talks by Ian Macleod and Fabien Milliat.

The conference was opened with a keynote lecture from **Robin Carrell** (Cambridge Institute for Medical Research, Cambridge, UK), 'Serpin revelations and Challenges'. This enthusiastic and entertaining talk focused on what is currently known about serpin biology and the future challenges in this area of research. It was an inspiring start to the conference.

One of the most interesting and engaging talks of the meeting was in the last session of the second day. **Ian Macleod** (Cambridge, UK) talked about the role of neuroserpin in dementia using *Drosophila* as a model system. Mutations in neuroserpin results in the dementia familial encephalopathy with neuroserpin inclusion bodies (FENIB). There are four different mutations that can occur in neuroserpin, with differing severity. Accumulation of protein aggregates is a characteristic of neurodegenerative diseases. FENIB differs from other neurodegenerative diseases as the accumulated protein consists of ordered polymers of the correctly folded protein. This accumulation of mutant protein is positively correlated with the severity of the clinical phenotype. They have expressed wild-type and mutant neuroserpin in *Drosophila* to record the effects of the accumulating polymers. The *Drosophila* model mimics the genotype-phenotype correlation seen in the human disease. Additionally this model showed an age-related decline in the clearance of the polymers.

Fabien Milliat (Institute for Radiological Protection and Nuclear Safety Laboratory of Radiopathy, France) gave a fascinating talk entitled, 'PAI-1 plays a clear role in radiation induced endothelial dysfunction'. Half of all cancers are currently treated with radiation therapy either alone or in combination with other cancer treatments. Radiation therapy however causes damage to both cancer and normal cells, thus the benefit to risk ratio must be considered before treatment is issued. Radiation can cause endothelial dysfunction and

vascular injury which in turn damages normal tissue. The study focused on radiation treatment for abdominal and pelvic cancers. Tissue samples were taken from a group of 25 patients 5–7 weeks after radiotherapy treatment. *In situ* analysis revealed an increase in PAI-1 expression in the radiation treated tissues. PAI-1 is a target of TGF-β1, a key mediator of radiation induced tissue damage. A

mouse model of radiation enteropathy was also used. Radiation injury was monitored in both Wt and PAI-1 deficient mice. It was seen that radiation induced injury was attenuated in the PAI-1 deficient mice. PAI-1 deficient mice were protected against radiation induced damage, with an increased survival rate and better intestinal function compared to Wt mice. The study demonstrated that PAI-1 plays a role in radiation induced injury, suggesting that PAI-1 is an attractive target for reducing the toxic effects of radiation treatment.

I presented my poster on the role of the serpin maspin in prostate cancer in the first of two poster sessions and was pleased to attract lots of interest. Talking about my work and answering the many questions I was asked was challenging and rewarding. I received praise for my current work and some thought provoking suggestions for future potential directions.

The second poster session was held on the fourth day. In this session I was particularly interested in the work demonstrated by Umbreen Ahmed (University of Birmingham, UK). Umbreen Ahmed is a third year PhD student who works on 'Probing the pH-dependant Conformational Change for the Non-inhibitory Serpin HSP47'. Heat shock protein 47, is a serpin which serves as a human chaperone protein for collagen. HSP47 unloads its collagen cargo in the golgi which is then recycled to the endoplasmic reticulum. The conformational switch during unloading of cargo is mediated by a drop in pH. She first mutated HSP47 at six histidine residues positioned at the top of beta sheet A and then purified using gelatin affinity chromatography. Using circular dichroism it was demonstrated that wild type protein is monomeric and denatures at 55°C. Mutant protein was also monomeric but resisted thermal denaturation up to 90°C, which was indicative of a latent conformation. Using pH dependent studies, it was found that two mutant residues H197 and H198 resisted a drop in pH. Thus it was concluded that both residues are involved in pH-induced conformational change. I enjoyed talking through methods and problems with someone of experience as I hope to use these techniques in the future.

In conclusion, 30 years of studies have clearly unveiled the structural mechanism of the serpins. The challenge ahead is to show how these individual mechanisms are utilised and modulated within the cell and how they can be exploited for therapeutic benefit.

Overall the meeting was entertaining and motivating, covering a variety of areas in Serpin Biology. I would like to thank the BSCB for awarding me the Honor Fell Travel Award which allowed me to attend this conference.

Laura Wagstaff
Biomedical Research Centre, University of East Anglia, UK

2008 Conference on Cell Replacement in the Inner Ear

13–15 June 2008; Bethesda, Maryland, USA

Since deafness is a major public health problem worldwide, with approximately 9 million people in the UK affected to a moderate or severe degree, regenerative therapy is absolutely exciting field as a highly potential strategy to cure this particular condition in the next decade. The major goal of this conference was to highlight the new technology and concepts of cell replacement and regeneration biology of the organs of the inner ear, i.e., cochlea, vestibular organ and primary neural pathway.

The conference was sponsored by the Deafness Research Foundation, the National Institute on Deafness and Other Communication Disorders/National Institutes of Health (NIH) and the University of Washington. Only 120 participants, scientists, clinicians and students attended, but most of them were experts in this specialty and related fields. The conference was organised into six topics: system regeneration, stem cells, cell cycle regulation, cell fate regulation, new methodologies, and translational issues.

The conference was officially opened in the early morning of 13 June 2008 with welcome speeches from **George Gates**, Medical and Scientific Director of the Deafness Research Foundation, and **James Battey**, Jr., the Director of the NIH Institute on Deafness and Other Communication Disorders. Another impressive welcome speech was made by **Sanford Greenberg**, who suffers from permanent blindness. As a result, he and his family have been motivated to dedicate themselves to furthering research regarding nervous system regeneration in order to find new therapeutic strategies for neurological disorders. The Greenberg Family kindly provided a grant to the NIH Institute on Deafness and Other Communication Disorders to financially support this meeting and make it possible.

The first session was on regeneration. **Alejandro Sanchez Alvarado**, University of Utah School of Medicine, was the first speaker who gave a very nice basic introduction to regeneration using Planarians as a model. This was followed by **Jean Campbell**, University of Washington, who has dedicated herself to the study of liver regeneration; her group identified heparin binding epidermal-growth factor (HB-EGF) as a key mediator in the stimulation of 'primed' hepatocytes to traverse the S-phase. HB-EGF also appears

to be critical for hepatocytes to progress through G1-S restriction points. From the liver to the nervous system, **Thomas Reh**, University of Washington, showed the attempt to use human embryonic stem cells (hESCs) to repair the retina after photoreceptor degeneration by stimulation of intrinsic regeneration from Muller glia, and cell replacement using hESC-derived photoreceptors, which might be an option for the treatment of human retinal degeneration.

After three talks about the regeneration of different organ models, we moved forward to the organs that most people in this meeting were interested in, the cochleae and vestibular organs. Auditory regeneration was presented by **Douglas Cotanche**, Boston University School of Medicine. His key message was that when hair cells in the mammalian cochleae undergo apoptosis due to various causes, e.g., noise trauma and ototoxic drugs, the supporting cells do not possess the ability to regenerate. The permanent loss of sensory hair cells results in spiral ganglion neuron degeneration as a consequence. **Mark Warchol**, Washington University School of Medicine, presented an overview of the mechanisms of vestibular regeneration. The presentation showed that the molecular signals that are responsible for correct cellular patterning during regeneration have not been identified, but they are likely to be similar to those that act during the embryonic development of the ear. The last talk of the first session was on hair cell regeneration in the zebra fish lateral line by **David Raible**, University of Washington. The take-home message from this talk was that the Notch signalling pathway controls hair cell regeneration by regulating precursor proliferation. Expression of Notch pathway components, notch3, delta, and atoh1a, is up-regulated during the time of maximum support cell proliferation.

The second session was on stem cells, which is my own field of interest. **Mahendra Rao**, NIH on Aging, Baltimore, a famous researcher in the neural stem cell field, gave a brief introduction about neural stem cells (NSCs) and differentiation to specific neurological organs, and then, the example of NSC differentiation to retina was presented by **David Gamn**, University of Wisconsin, who has developed a novel culture and differentiation protocol for human retinal progenitors from hESCs that is suitable for further experimentation and is hopeful for the treatment of blindness. Another example of hESCs differentiation concerns the endoderm, which is affected by DNA methylation changes, presented by **Julie Baker**, Stanford University. The highlight of stem cell transplantation technology was a talk by Juichi Ito, Kyoto University. He showed his efforts in cell therapy using either mouse or monkey ESC-derived neural progenitors transplanted into the cochleae of deaf guinea pigs and monkeys, which had been damaged by either ouabain or cisplatin application. The treatment appears to result in functional recovery of transplanted cochleae in both animals, indicating the potential therapy for spiral ganglion neuron regeneration.

The third session was on cell cycle regulation and the first speaker was **Michael Dyer**, St. Jude Children's Research Hospital, who has studied the role of the Retinoblastoma (Rb) gene in retinal development. Rod photoreceptors fail to differentiate in the absence of the Rb1 gene, and Rb1 gene inactivation leads to retinoblastoma in humans but not in mice. From the cell cycle of the eyes to the ears, **Neil Segil**, University of Southern California, presented a brief overview of the developmental mechanisms regulating cell cycle exit in the organ of Corti and vestibular systems. After this talk, there were several submitted papers to be presented. The most interesting one was a talk by **Takayuki Nakagawa**, Kyoto University. He presented the induction of proliferation of supporting cells using RNAi of p27kip1 in mouse auditory epithelia, a method that seems to be a potential strategy to induce the proliferation of post-mitotic supporting cells, which are sensory hair cell precursors.

The fourth session was on cell fate determination and differentiation. We had a very good opportunity to listen to talks from speakers like **Jane Johnson**, University of Texas, and **Anand Swaroop**, National Eye Institute, NIH. They helped us to understand the complicated concepts of cell fate determination using brain and spinal cord models (Johnson) and retina (Swaroop). After this clear introduction to cell fate determination, **Matthew Kelley**, NIDCD/NIH and **Jennifer Stone**, University of Washington, discussed cell fate determination in the developing and regenerating inner ear, respectively, in more detail. By the end of this day, I was looking forward to hearing the talk from my supervisor, **Marcelo Rivolta**, University of Sheffield. Our work was selected as a submitted paper in this conference and he certainly gave an excellent presentation to show that we have been able to isolate and differentiate human stem cells from different sources: human fetal auditory stem cells (hFASCs), hESCs, and human mesenchymal stem cells (hMSCs). Moreover, he also introduced other related studies that were submitted as posters by our lab members to the audience before the next poster session, including my work regarding neuronal differentiation. Many people came to my poster after his talk and this was a good opportunity for me to discuss my work with many experts from around the world. My poster presentation was entitled "Extracellular proteases modulate the differentiation of spiral ganglion neurons from hFASCs". Briefly, I presented the robust phenomenon of neurite elongation as a bipolar phenotype in hFASCs after they have been exposed to trypsin and other serine proteases.

The talks on the last day included session V, on new methodologies, and session VI, on translational issues. The first speaker of session V was **Michael Lovett**, St. Louis School of Medicine. His work combines several methods of system biology to identify the gene expression of the avian inner ears, especially the Pax genes. Briefly, Pax2 and Pax5 RNAi treatments inhibit the proliferation of vestibular sensory epithelia, whereas Pax3 and Pax7 RNAi treatments do not. Next, the technical challenges of delivering substances to the cochlea were presented by **Alec Salt**, Washington University School of Medicine, who reported a strategy to use 1% hyaluronate gel applied at the injected site to prevent perilymphatic leakage after pipette injection at the round window during substance delivery to the cochlea. **William Sewell**, Harvard Medical School, introduced a new innovation to use a pump based on Microfluidic and Microelectromechanical Systems (MEMS) technology to deliver drugs to the cochlea. After that, **Yehoash Raphael**, University of Michigan, brought us to the world of gene delivery to the mammalian inner ear. Viruses appear to be the most effective vectors to deliver the gene to the inner ear *in vivo*. The last speaker of this session was **Stefan Heller**, Stanford University. He presented an excellent study on the differentiation of hair cell-like cells from hESCs, which provides hope for transplantation in deaf people. The last session in the afternoon on translational research challenges included auditory system reconstitution, vestibular system reconstitution and functional assessment of outcomes presented by **Andrew Forge**, University College London, **Hinrich Staecker**, GenVec Inc., and **Brenda Ryals**, James Madison University, respectively. The conference ended in the afternoon by a special talk from **Jeffrey Corwin**, University of Virginia, regarding his vision for the next 10 years of auditory research.

To sum up, this conference gave me a valuable opportunity to meet world-famous people in this particular field and it was a great opportunity to discuss my work with many of them. I am very grateful to all organisations who offered me travel grants to attend this meeting. First, I would like to thank the British Society for Cell Biology for the Honor Fell Travel Award, and second, the NIH on Deafness and Other Communication Disorders for the Greenberg Family Travel Grant. Finally, I would like to acknowledge my supervisor Marcelo Rivolta and my main PhD sponsor, the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand, for giving me the opportunity to work as a PhD student at the University of Sheffield.

Objoon Trachoo
Centre for Stem Cell Biology, Department of Biomedical Science, University of Sheffield, United Kingdom

The 33rd International Herpes Virus Workshop

27 July – 1 August 2008; Estoril, Portugal

The conference brought together scientists from around the world to discuss the many varied aspects of herpes virus biology. Although, herpes is not the most glamorous subject for a conference this conference has a sense of humour with T-shirt slogans such as "I don't have herpes but I'm working on it".

This conference, organised by Tony Minson, Patrick Sissons, John Sinclair (University of Cambridge), Pedro Simas (Lisbon, Portugal) and Mike Parkhouse (Lisbon, Portugal), featured over 150 talks and over 300 posters. Over 500 people attended, which made it a very large and varied meeting. The main topics included pathogenesis, virus cell interactions, entry, assembly, egress, immunology, latency, antivirals, vaccines, gene expression and DNA replication.

The major goal of the meeting was to highlight the most exciting recent advances in herpes virus research. The meeting lasted for 6 days and focused on the most exciting recent advances in herpes virus research and featured mostly recently or about to be published data. The first day consisted of satellite workshops consisting of short 10 minute talks. In the morning you could choose from veterinary herpes viruses and varicella zoster virus while in the afternoon you could attend either beta herpes viruses, herpes simplex virus or the interventions satellite workshops. There was a welcome reception at Estoril casino which was a good opportunity to talk science to other delegates and meet people presenting at the conference. This was a wonderful venue, as the casino has spectacularly lit gardens and fountains and it was a really enjoyable evening. It provided a great opportunity in order to share research interests and impressions of the conference.

The next days of the meeting consisted of 3 sessions of talks on one of the aforementioned topics followed by a poster viewing session, during which there was opportunity to view the posters and share useful discussions. On three nights there were a 45 minute talks on key topics. Due to the amount of different sessions which covered a vast quantity and range of research, in this report I am going to cover just a few aspects of the lectures which I particularly enjoyed.

One of my personal highlights of the entire conference was the keynote lecture on microRNAs given by **Bryan Cullen** on viral microRNAs (Duke University Medical centre, USA). This lecture reflected the processing of microRNAs and also the mechanisms by which they can degrade mRNAs or prevent translation and the relevance of this for herpes biology by regulating both maintenance of and reactivation from latency. The withdrawal of a *Nature* paper about a microRNA from the latency associated transcript region of herpes simplex virus 1 make this an area of interest and controversy as reflected by the questions.

One of the most interesting and most scientifically sound talks of the meeting was by **Jennifer Lin Ubach** (Duke University Medical centre, USA) about the data in her recent *Nature* paper entitled "MicroRNA expressed by herpes simplex virus 1 during latent infection regulate viral mRNAs". This talk illustrated that the microRNAs miR-H2 and miR-H6 inhibit translation of ICP0 and ICP4 respectively. These are immediate early genes expressed upon the initial stages of reactivation so it is important that translation of these genes is suppressed in latency.

Some of the sessions were contentious with differing opinions between different groups being voiced in controversial areas such as latency, reactivation and gene expression. Therefore, it was a good opportunity to look at the ideas of conflicting groups in order to form my own opinion. For example, ICP0 and the latency associated transcript were previously implicated in the initial trigger important for reactivation but it was presented by **Richard Thompson** (University of Cincinnati, USA) that VP16 is important for this initial step although some groups disagree with this notion.

These talks were particularly eye opening to me as they destroyed many of the ideas I previously thought which had shaped my project. Had I not attended this conference I would have not realised so soon the complexity of the transcriptional processes occurring in the region I'm looking at in herpes simplex virus 1 in addition to the relevance of the different genes and microRNAs for reactivation. This knowledge has enabled the development of new ideas and will allow the direction of my project in the most productive direction.

A further highlight was the Subak-Sharpe lecture entitled herpes virus genomes in time and space by **Duncan McGeoch** (Glasgow University). This was interesting as it covered previous and ongoing evolution of herpes viruses and highlighted not only how herpes viruses are so varied as a result of evolution and divergence over hundreds of millions of years but also how high throughput sequencing can now accelerate understanding of current herpes virus strains. As I am working on both herpes simplex virus and murine herpes virus 68 this lecture highlighted that murine herpes virus 68 evolved and herpes simplex virus 1 diverged from a common ancestor 240 million years ago.

All in all the quality of material presented at the meeting was very high and it was generally felt by the delegates I spoke to that the conference was beneficial and covered areas of interest to people working in the field. The meeting was entertaining, covered a huge variety of topics and a great opportunity to share ideas and present data from my PhD studies into the role of the reiteration element 1 in transcriptional control of herpes simplex virus 1 at a prestigious herpes virus conference.

In addition, I was able to attend a wide range of lectures in order to enhance my knowledge of latency and transcription of herpes simplex virus 1 in addition to increasing my background knowledge of herpes viruses. I would like to thank the BSCB for the Honor Fell Travel Award which helped me to attend this meeting which has boosted my enthusiasm for my PhD project.

Hannah Stevens
Department of Physiology, University of Liverpool

The 2008 Golgi Meeting

4–9 September 2008; Pavia, Italy

> The meeting will be remembered by those attending not only for its intense scientific sessions, but also for the high temperature (30°C when boarding the shuttle bus from the airport to Pavia, at 5 pm), the mosquitoes (quiet, but very hungry – the number of visible bites on arms and shoulders grew as the meeting progressed), and the beautiful old city of Pavia (which came alive after 9 pm, particularly on Saturday night when the main streets resembled a people's M25).

This was the second meeting held to provide a strategic view on the evolution of the Golgi complex. The first was held 10 years ago, on the 100th year anniversary to commemorate the original description of this organelle by Camillo Golgi in 1898.

The organisers had identified four major overlapping areas that they wished to be presented and discussed at the meeting: "The molecular machinery of the trafficking pathways: new molecular components in membrane trafficking are still being described at a brisk pace, particularly with the use of the potent 'omic' approaches. Many of these new players are also being shown to have roles in other cellular functions; The morpho-functional organization of the trafficking pathways: the ways in which endocytic and exocytic transport are organized at the supramolecular level is gradually becoming clearer amidst lively debate, and important novel aspects have appeared on the horizon; The links between trafficking and other cellular functions: the ways in which trafficking is deeply interlinked with other fundamental cellular processes has been progressively emerging, which include signalling, mitosis, apoptosis and metabolism; The diseases and the pharmacology of trafficking: the emerging roles that defects in the trafficking machinery have in human diseases and the possible pharmacological strategies to remedy these defects are only now coming into focus."

Over 300 people attended, most staying in the scattered colleges of Pavia University, one of the oldest in Europe (some colleges were built in the 16th century). There were 73 speakers (more than 40 invited, the rest were chosen from submitted abstracts) and 200 posters – their abstracts were provided in a very useful accompanying book. Almost all were directly connected to the Golgi complex in some way. In addition, the book 'The Golgi Apparatus' edited by Mironov and Pavelka, and was published (Springer-Verlag) to coincide with this meeting.

I wanted to attend this meeting as recent disease research had landed me within this organelle. It was an ideal opportunity to ask my own specific questions and to be updated on current work and approaches. The talks were excellent. For these reasons, it was a worthwhile meeting, and I came away informed and with some (but not all) of my questions answered. As I pursue my own research interests, I can identify appropriate experts to contact for discussion, and am more aware of the controversies and, frustratingly, the gaps within the field.

The meeting divided into nine sessions, containing a mix of invited speakers and those chosen from submitted abstracts. In '**Evolution/organisation of membrane trafficking**' I was particularly interested in the differences between Golgi in diverse species (**Graham Warren**, Max F. Perutz Laboratories, Wien, Austria; **Catherine Rabouillle**, UMC Utrecht, The Netherlands; Joel Dacks, University of Cambridge), the possibilities of further trafficking pathways and compartments (**Jaakko Saraste**, University of Bergen, Norway; **Kristian Prydz**, University of Oslo, Norway), and a high-resolution vitrified EM methodology to visualise the Golgi (**Markus Grabenbauer**, Max-Planck-Institute for Molecular Physiology, Dortmund, Germany).

In '**Membrane morphogenesis: membrane bending, fission and fission**' we were prompted to think more about the contribution of the physical properties of membranes to their behaviour (**Joshua Zimmerberg**, NIH, Bethesda, USA), as well as the role of proteins (**Pietro De Camilli**, Howard Hughes Medical Institute, Yale University School of Medicine, USA; **Sandra Schmid**, The Scripps Resarch Institute, La Jolla, USA; **William Brown** Cornell University, USA) and their domains (**Harvey McMahon**, MRC Laboratory of Molecular Biology, Cambridge).

'**Carrier formation**' began with an excellent talk on coated vesicle biogenesis (**Randy Schekman**, University of California, USA), and continued similarly, including the role of AP-4 complex in APP (**Juan Bonafacino**, NIH, Bethesda, USA), and the possibility of alternative pathways to lysosomes revealed by EM studies (**Judith Klumperman**, UMC Utrecht, The Netherlands). 'Small GTPases' also touched on APP (**Richard Kahn**, Emory University School of Medicine, USA), and lipid ordering (**Sean Munroe**, MRC Laboratory of Molecular Biology, Cambridge).

In '**Trafficking and Signalling**' the structural and secretory integrity of the Golgi was discussed (**Mark McNiven**, Mayo Clinic, Rochester, USA), which prompted some discussion on consistent nomenclature of the Golgi architecture (ribbon vs. fragmentation or individual ministacks vs. vesiculation).

'**Membrane trafficking and lipid metabolism**' attempted to explain the contribution of sterols and sphingolipids to trafficking in yeast (**Howard Riezman**, University of Geneva, Switzerland), and the contribution of membrane curvature and tension to dynamin function (**Aurelién Roux**, CNRS/Institut Curie, France).

'**Membrane trafficking, cell polarity and the cytoskeleton**' included the only plant Golgi talk which attempted to explain their highly visual motility (**Imogen Sparkes**, Oxford Brookes University).

'**Membrane trafficking and disease**' was interesting, though the Golgi connection disappointingly not so apparent, and attempts to get to the bigger picture were presented in 'Membrane trafficking in high-throughput studies'.

My poster was one of many interesting posters that were fortunately displayed for the whole meeting, allowing plenty of time for reading

and discussion: stable lipid shapes and the influences of different lipids to explain the size and curving of flattened Golgi stacks (J Derganc); the influence of transmembrane domains in sorting through the secretory pathway (H Sharpe); Golgi dysfunction in disease, e.g. a skin disease, cutis laxa, caused by mutations in a v-type H+-ATPase subunit and the contribution of a novel golgin to osteoporosis (U Kornac); to highlight only three.

I am grateful to the BSCB in providing me with an Honor Fell Travel Award that allowed me to attend this meeting.

Sara Mole
MRC Laboratory for Molecular Cell Biology, UCL

Further details:
www.negrisud.it/golgi2008/about.php

16th European Cell Death Organization Conference on Apoptosis

6–9 September 2008; Bern, Switzerland

My first international scientific meeting took place in the beautiful Swiss capital of Bern. This historical city, set on a peninsula surrounded by the river Aar with the snow-capped Bernese Alps in the distance, provided the prefect location for our conference.

The meeting was preceded by the 5th training course on 'Concepts and Methods in Programmed Cell Death' which was held on the first day of the conference. This provided a useful 'refresher' course on the topics at hand.

Adi Kimchi (Weizmann Institute, Israel) gave an overview of the different forms of cell death: apoptosis, autophagy and necrosis. She highlighted the differences in cellular phenotypes and noted common protein markers that are used to distinguish between each type of death. However she also warned that it is important to keep in mind that mixed phenotypes of programmed cell death can occur in a single cell, as some signalling or effector molecules are common in both apoptosis and autophagy, such as p53 or Bcl-2.

Audience participation was greatly encouraged by **Doug Green** (St. Jude Children's Hospital, Memphis, USA) who gave us a choice of talk – votes were cast and the winner was 'the immune response to dead cells'. Doug discussed how apoptotic cells promote immune tolerance but do not promote immunogenicity unless caspase activation is blocked or deficient. This immune tolerance requires caspase-3 cleavage of p75 NDUSF1 (a component of the electron transport chain) which results in oxidation of HMGB1 (high mobility group box-1 protein), a 'danger' signal released from dying cells. This therefore neutralises the potential immune stimulatory activity. If caspase activation is blocked, p75 is not cleaved and therefore apoptotic cells are not tolerogenic but are immunogenic.

All too soon, it was time for my own presentation on the regulation of the anti-apoptotic protein Mcl-1 in the cell cycle. Despite the obvious nerves, it was definitely worth doing, not only for all the feedback I received but also for the experience of presenting to over 300 fellow scientists.

Seamus Martin (Trinity College, Dublin) spoke on Bcl-2 family proteins involved in mitochondrial fission and fusion. His group have found that these proteins may contribute to regulating mitochondrial dynamics, independent of their role in apoptosis. He concluded that Bcl-xL suppresses Bax- or Bak-dependent cytochrome c release and promotes mitochondrial fission and fusion. Therefore Bcl-xL may perturb mitochondrial interactions with the cytoskeleton.

A wonderful dinner that evening at the beautiful old Kornhauskeller in the centre of Bern provided a further opportunity to meet and get to know fellow delegates.

Highlights from the next day's talks included **Philippe Bouillet** (Walter and Eliza Hall Institute, Australia) describing his fascinating work with knock-out mice models to study the function of the BH3-only members of the Bcl-2 family. Simply using webbed feet as an indicator of apoptosis during development, he clearly demonstrated that Mcl-1 can restrain Bak but cannot restrain Bax. He also showed that the BH3 domain of Bim has abilities that rescue the phenotypes of Bcl-2 knock-out mice; however the BH3 domains of Bad, Noxa or Puma could not.

Conference organiser **Thomas Brunner** (University of Bern, Switzerland) spoke on interactions between death receptor and mitochondrial apoptosis pathways in hepatocyte cell death. TRAIL amplifies FasL-induced hepatocyte death by inducing JNK phosphorylation and subsequently phosphorylation of BH3-only protein, Bim. Inhibition of JNK reduces Fas-induced Bim phosphorylation and reduces TRAIL- or Fas-mediated death. TRAIL synergises with other drugs, such as doxyrubicin, and induces cell death by increasing Bax activation and translocation, thereby increasing cytochrome c release.

Dieter Demon (University of Ghent, Belgium), a postdoc from the lab of Peter Vandenabeele, used a proteomic approach to demonstrate that caspase-3 and -7 prefer different cleavage sites. He used the technique differential SILAC (stable isotope labelling with

amino acids in cell culture) followed by mass spectrometric analysis to identify over 50 cleavage sites in 50 potential caspase-3 and -7 substrates. The majority of these sites were shared by both caspases, however 3 sites were found to be unique to potential caspase-3 substrates and 7 cleavage sites were specific for caspase-7 substrates. Caspase-3 was found to cleave at DEVD better than caspase-7, and caspase-7 cleaved at KDVKD better than caspase-3. He also showed that caspase-7 prefers native protein structures.

Josef Penninger (Institute of Molecular Biotechnology, Austria) gave the ECDO keynote lecture on programmed cell death. His highly entertaining talk covered various topics from acute lung injury and SARS virus to diabetes and obesity. He discussed how ACE2 (angiotensin converting enzyme 2) protects against acute lung injury and is also an essential SARS virus receptor *in vivo*. He also described their work with a *Drosophila* RNAi screen that screened thousands of genes in order to identify those required for nicotine-induced neuronal cell death – about 250 genes have been found so far.

The meeting concluded with a delicious gala dinner and a (very amusing) disco at the Dählhölzli restaurant in the Tierpark. Overall, the conference was a fantastic opportunity to hear top class speakers and meet scientists from my area of research and beyond. It was a great experience and I would definitely recommend future ECDO meetings. I would like to thank the BSCB for the Honor Fell Travel award which enabled me to attend the conference.

Margaret Harley
Biomedical Research Institute, University of Dundee

44th Annual Meeting of the European Association for the Study of Diabetes

7–11th September 2008; Nuova Fiera di Roma, Rome, Italy

Everything which is great and not-so-great about Italy can be found in Rome. It is hot, bustling, disorganised, beautiful, filthy, awesome and infuriating. The food is either spectacularly exquisite or spectacularly dull (but almost always spectacularly expensive), the people are both as friendly and as unfriendly as you could ever hope to meet, and the architecture takes your breath away, even if most of the buildings are covered in graffiti.

The sheer age and grandeur of some of the constructions is mind-boggling, and the fact that some of them are still standing (in the case of the Pantheon, almost intact) after 2000 years is a testament to the genius and ambition of their builders.

I was in Rome in September for the 44th annual meeting of the EASD. A large meeting for a large city – there were over eighteen thousand delegates, representing over one hundred countries, a statistic that shows the success of the EASD for attracting researchers from well beyond the boundaries of Europe. As one colleague of mine said, after seeing the vast arrays of posters and delegates, 'You'd think we might have cured it by now'. I hasten to add that he was joking, but the scale of the conference reflects the complexity and importance of research into this disease. In the UK alone, up to 10% of the NHS budget is spent on treating type-II diabetes or its related complications, and this may well rise in the coming years.

The opening lecture was delivered by **Camillo Ricordi** of Miami, where he eloquently described both the history and recent developments in islet transplantation. These include the use of new immunosuppressant drugs, which greatly increase the success rate of this procedure, and also new technologies, such as nanoencapsulation of the graft, which allows both localised immunosuppression and also improved vascularisation. He also touched on creation of new islet cells by trandifferentiation of acinar and liver cells (a topic which was covered more thoroughly in subsequent talks). Thus the opening lecture was, in a way, against the grain of the bulk of the conference, as, for obviously reasons, most of the research presented was on type-II diabetes.

A theme of many of the talks I attended on the first day of the conference was that of fat storage. One big question in type-II diabetes research is why some obese people develop the disease and others do not. This was firstly addressed in session OP6 – **Fat Traffic and Parking**, where, amongst others, **Leigh Perrault** delivered an excellent talk on distinguishing pre-diabetes from obesity in humans by showing that intramuscular triglyceride (IMTG) concentration was higher and turnover was lower in pre-diabetic subjects when compared to healthy obese controls. The concept that it is not the amount of fat, but how it is stored, was nicely recapitulated in the delightfully entitled Dennis McGarry Symposium later in the day ('What if Minkowski had been ageusic?'), delivered by Steve O'Railly and Gerald Shulman.

Steve O'Rahilly's talk was again on the theme of fat storage, and focussed on why too much adipose tissue is disadvantageous. This study involved two human cases with PPARγ mutations, which results in low levels of adipose tissue, but metabolic syndrome, the idea being that, if fat is not stored correctly in the adipose tissue, it is stored in the muscle and liver, leading to insulin resistance. In fact, one of the patients studied had no symptoms until he stopped his

90-mile a week running schedule, at which point he developed massive insulin resistance.

Gerald Shulman's talk focussed on the mechanism of fat-induced insulin resistance. He also showed that transgenic mice which lack the capacity to store fat develop insulin resistance, a trait which is reversed if fat is transplanted back. Again, this demonstrates that is not the amount of fat which is important, but how it is stored. Indeed, this study found no role for adipocytokines in the onset of lipotoxicity, rather it showed that intracellular DAG levels were linked to insulin resistance.

Day two of the conference started with the EASD/JDRF Symposium on **β-cell neogenesis**. This was started by **Andrew Stewart**, who delivered an interesting talk on β-cell replication, demonstrating that the dogma that β-cells do not replicate is not necessarily true. Replication in rodent β-cells is very easy to induce, but this is very hard or impossible in humans, partly due to the poor understanding of human cell cycle control. **Luke Bowens** next talked about the possibility of β-cell production by transdifferentiation from pancreatic acinar cells, a technique which has been successfully shown to restore glucose tolerance in diabetic mice. After this, **Emmanuel Baetge** spoke about producing β-cells from embryonic stem cells. The session was concluded by Peter Butler, whose presentation was on the increasing evidence of β-cell regeneration in adult humans. This appears to be achieved by differentiation of new β-cells, rather than β-cell replication.

Other highlights of day two included a symposium on the dynamics of β-cell exocytosis. **Harumi Takahashi** presented interesting work showing that the first phase of glucose-induced insulin secretion does not primarily involve the fusion of predocked granules with the plasma membrane. Most of the granules for this phase appear to be newly recruited from pools in close proximity, but not docked, with the membrane. Both **Michael Willenborg** and **Magalie Ravier** gave talks demonstrating that glucose induces insulin secretion not only through inactivation of the KATP channel, but also by other mechanisms. In this session also, Fabrice Chimienti delivered an interesting study on a SNP in a zinc transporter, ZnT-8, which is linked to T2DM.

The first symposium I attended on day three concerned **ER stress in type 2 diabetes**. This discussion of a complex field began with an introduction to ER stress by **Randal J. Kaufman**, followed by a discussion of the role of lipotoxicity (by saturated free fatty acids) in inducing ER stress in the β-cell, delivered by **Decio Eizirik**. This talk demonstrated the role of different signalling cascades, including JNK and CHOP, in fatty acid-induced apoptosis. **Fabian Foufelle** then spoke about the role of ER stress in hepatic energy metabolism, highlighting the role of overexpression of the transcription factor, SREBP-1c in mediating the effects of ER stress in obesity. The session was concluded by a talk from **Umut Ozcan**, linking ER stress to insulin resistance.

Day three concluded with the 43rd Minkowski Lecture, possibly the highlight of the conference, delivered by **Jens Brüning**. This superb lecture concerned the role of insulin in the central nervous system, and covered subjects ranging from the role of insulin in long-term programming of body weight (a high fat diet in pregnant mice results in significantly heavier offspring, an effect dependent on the presence of the insulin receptor on POMC neurones), to the potential role of insulin in the ageing process. In the latter part of this talk, he demonstrated that reducing insulin signalling in the brain in mice and *C. elegans* increases life-span in a manner similar to caloric restriction.

Day four was the last day of the conference, and therefore there were fewer talks than on the previous three days. One symposium of great interest, however, was on the debate between using drugs or lifestyle changes to treat type-2 diabetes. This symposium was delivered by **P. Zimmet** and **N.J. Wareham**, and came to the surprising conclusion that drug therapy has no proven long term benefit, as it removes the responsibility of people to change their lifestyles. Any effect arising from mass drug therapy is likely to be small, compared to the big changes which could be effected by lowering the average BMI of the population.

And this leads nicely to the concluding message of this conference. There were more than eighteen thousand researchers, over 250 talks and in excess of 1000 posters, the majority of which were on some aspect of type 2 diabetes. There are many, many different aspects of this disease, and many different theories as to the key factors and the most important pathways in disease progression. Only one thing was agreed on in every piece of research: more exercise and a healthy diet is still the only truly effective way of preventing and controlling type 2 diabetes.

Tim Craig
University of Oxford

Epithelial Morphogenesis and Diseases

8–10 September 2008, University of Greenwich

This was the third thematic Autumn meeting organized by the British Society for Cell Biology, following the previous meetings on epithelial cells in 1994 and 1998. It was an instant success!

The speakers gave their presentations with the clear agenda to share with the audience their areas of expertise, and their latest results in the study of epithelia. The conference was very well organised which generally ran on time. It was beautifully located, central to the main utilities such as the conference room, hotel accommodation and the food service area. The friendly atmosphere allowed for productive discussions throughout the course of day and during recreational time.

The topic of the conference was focused on epithelial cells, and the speakers were excellent. The meeting started with the topic of stem cells and then progressed to morphogenesis, cell-cell adhesion, epithelial polarity and ultimately ending with epithelial abnormalities. On the first day, a very interesting talk was given by **Inke Nathke** (Dundee, UK) about changes in gut tissue architecture induced by mutations in APC (adenomatous polyposis coli). Using multi-photon microscopy, her group established quantitative parameters that describe this tissue in three dimensions. With these parameters they were able to identify the earliest measurable architectural changes in Apc mutant tissue, which appears normal by conventional histological analysis.

Particularly interesting was the research presented by **Ken Yamada** (Bethesda, USA) on the **Morphogenesis** session about the relationship between cells and extracellular matrix during epithelial branching in embryonic development. His team has recently identified a new regulator of branching morphogenesis - Cleftin, which appears to provide mechanistic link between extracellular matrix dynamics and cleft propagation. They established a correlation between local induction, accumulation and translocation of the fibronectin, and Cleftin induction, which leads to epithelial tissue remodelling and cleft propagation.

The session on **Cell-cell adhesion** was highlighted by **Yasu Fujita**'s talk (MRC-LMCB, London). His work focus on the early events of tumorigenesis using a very smart model of study based on the dilution of a cell population expressing an inducible oncogenic form of Ras within a monolayer of normal epithelial cells. Hence, he described how competition takes place between normal and transformed epithelial cells.

A very exciting presentation was also given by **Senthil Muthuswamy** (Cold Spring Harbour) showing for the first time evidence of a tumorigenic effect of Scribble in mammals. Indeed, depletion of Scribble in mammary epithelia disrupts polarity, inhibits three-dimensional morphogenesis and apoptosis and gives rise to dysplastic mammary outgrowth in mice.

In the **Epithelial Cancer** session, **Margaret Frame** (Edingurgh, UK) presented the study on the role of tyrosine kinases Src and its substrate focal adhesion kinase (FAK) in promoting cancer invasion and metastasis. This is performed by perturbing cancer cell–cell contacts and integrin-dependent cell-matrix adhesion. The presenter showed an interesting model *in vivo* of genetically engineered mouse with cancer, with 'in-built' fluorescence which is being used for novel intra-vital imaging technologies. Using this model they can test agents with anti-invasive or anti-metastatic potential.

The meeting was a fantastic occasion to meet and discuss with scientists from our area of research. Formal poster sessions and informal tea breaks around more than sixty posters led the opportunity to gain valuable advice and excellent networking. Throughout the conference access to the poster areas was facilitated. The poster sessions were very useful and informative. The welcoming environment favoured scientific discussions and information exchange.

On Monday, a very interesting tour of the Greenwich campus was organised and we enjoyed a barbecue on a courtyard. On Tuesday, we had dinner and entertainment at The Admiral, a historic pub close to the campus and with a tremendous view above the Thames and the City. And finally, the last day, participants could also enjoy a tour of the Greenwich Observatory, visit the Maritime Museum or take boat trip on the Thames.

Overall the meeting provided great insights into the study on epithelia, and indeed left a great sense of satisfaction. We are extremely grateful to the organisers of the meeting, Vania Braga (Imperial College London, UK), Charles Streuli (University of Manchester, UK) and BSCB for this friendly, quite informal and excellent scientific event. In summary, I hope we do not have to wait another 10 years to attend the next BSCB Epithelial meeting!

Kasia Smolarczyk and Sebastien Nola
National Heart and Lung Institute – Imperial College London

Centrosomes and Spindle Pole Bodies

12 September 2008; EMBL, Heidelberg, Germany

> This centrosome meeting is held once every 2-3 years, making it an ideal forum to discuss new research and meet people with similar research interests.

The 1st EMBO conference on Centrosomes and Spindle Pole Bodies began with an opening talk by **Anthony Hyman** (Max Planck Institute of Cell Biology and Genetics, Dresden). The talk entitled 'Centrosome assembly in *Caenorhabditis elegans* embryos opened the meeting by highlighting the role of the centrosome in *C. elegans* cell division and the techniques that had been used to identify centrosomal proteins in *C. elegans*.

After the keynote talk, the session **Structural Aspects of MTOCs/Centrosome Cohesion** included talks by **Alexander Dammerman**, who works with **Karen Oegema** (Ludwig Institute for Cancer Research, La Jolla), on the role of HYLS-1 and its role in ciliary assembly and *Mette Mogensen* (University of East Anglia, Norwich) on the role of the centrosome in epithelial differentiation.

The Saturday morning session on **Microtubule Organisation by Centrosomes/Spindle Pole Bodies** opened with a talk by **David Agard** (University of California, San Francisco), revealing the work done on the structure of γ-tubulin with new insights into microtubule nucleation and polymerization.

Other talks in this session included **Isabelle Vernos** (Center for Genomic Regulation, Barcelona) on the kinase AuroraA, Andreas Merdes (CNRS Toulouse) on γ-tubulin and **Jens Luders** (Institute for Research in Biomedicine, Barcelona) on PLK1 regulation of NEDD1. Session 2 on **Centrosomes/Spindle Pole Bodies and Cellular Organisation** included a talk by **Michel Bornens** (Institu Curie, Paris).

Session 3 on **Control of Centrosome Number** began with **Monica Bettencourt-Dias** (Instituto Gulbenkian, Portugal) telling us about the control of the kinase SAK/PLK4. **James Maller** (University of Colorado) also gave a talk in this session on the interaction between cyclin E and MCM5 and their role in centrosome duplication.

Sunday's session on **Regulatory Functions of Centrosomes and Spindle Pole Bodies** included talks by **Gislene Pereira** (DKFZ, Heidelberg), **Snezhana Oliferenko** (TTL, Singapore), **Berl Oakley** (Ohio State University, Columbus), **Christine Sütterlin** (University of California, Irvine), **Stephen Doxsey** (UMass Medical School, Worcester), **Deborah Zyss** (Cambridge Research institute) and **Fred Chang** (Columbia University, New York).

In the morning, Berl Oakley, who discovered γ-tubulin, told us about how it inactivates the anaphase promoting complex. **Christine Sütterlin** told us about identifying the novel protein TUBA, and the role it plays at the Golgi in regulating the centrosome. Poster session II included presentations by **Jungmin Lee** (Seoul National University, South Korea) on the role of NIP2 in spindle assembly and **Lis Jakobsen** who had done a proteomic study on the centrosome in Jens Andersen's Lab (University of Southern Denmark, Odense).

After the poster session, **Stephen Doxsey** gave a talk about cilliogenesis. **Deborah Zyss** described the microtubule reorganization seen upon antigen presentation, and how the centrosome in T-Cells reorganizes to the immune synapse located between T-Cells and antigen presenting cells. The last talk of the day was given by **Fred Chang** on the role of CLASP proteins, in fission yeast.

Monday's first session was on **MTOCs in Evolution, Development and Disease**, and included talks by **Keith Gull** (University of Oxford) discussing the flagellum of trypansomes and **Susana Godinho** from **David Pellman**'s lab (Dana-Farber Cancer Institute, Harvard Medical School, Boston) looking at centrosomal clustering in cancer cells– in particular RNAi of HSET, which selectively killed cancer cells.

Session 2 on Monday was **Centriole Assembly**, and included talks by **Chad Pearson** (University of Colorado, Boulder), on the role of Poc1 in centriole assembly and **Trisha Davies** (University of Washington, Seattle) on dynamic microtubule attachment to kinetochores. **Erich Nigg** (Max-Planck-Insitute of Biochemistry, Martinsried) also gave a diverse talk on some of the work his lab has been doing on centrosome duplication and maturation.

Monday afternoon at 4pm we all got onto buses that took us down to the river in downtown Heidelberg, where we boarded the Alt Heidelberg and set off on our evening cruise down the river Neckar, offering sights and sounds of Heidelberg Castle and the local band.

Tuesday was back to business and the last session of this meeting, **MTOCs in Evolution, Development and Disease II** opened with a talk from **Helen Dawe** (University of Oxford), telling us about the role of Meckelin in cell migration during ciliogenesis. **Tim Stearns** (Stanford University, Stanford), a well known figure in his field gave an exciting talk mid-morning on plk1 and separase in centriole disengagement. The last talk of the meeting was given by **Jordan Raff** (The Gurdon Institute, Cambridge) on centrosome clustering in *Drosophila*.

I would like to thank the BSCB for their generous Honor Fell Travel Award which enabled me to attend this meeting.

Deborah Goldspink
School of Biological Sciences
University of East Anglia

The European Muscle Congress 2008

13–16 September 2008, Oxford

A conference in the UK, in autumn, with college hall catering – what comes to your mind? Rain and bad food. But all pessimists (like me) were heavily disappointed. The EMC 2008 was a superb meeting: excellent scientific talks and poster presentations, lively discussions, a stunning location, great food, and sunshine! The organisers Steven Marston (Imperial College London) and Charles Redwood (Oxford) did an excellent job, thanks once again.

The meeting started on Saturday evening with an informal reception. After a solid Full English breakfast on Sunday morning, **Steven Marston** briefly welcomed the all participants. The focus of the first scientific session was the '**Thin Filament**'. **William Lehman** (Boston University School of Medicine, USA) and **Michael Geeves** (University of Kent) gave an introduction into structural and regulatory concepts of troponin and tropomyosin molecules, followed by 4 further talks. Among them, **Weihua Song** (Imperial College London) gave a very nice presentation of his work in mouse models of familial hypertrophic cardiomyopathy with ACTC mutations.

The second morning session continued with the topic '**Cytoskeleton**'. **Carol Gregorio** (University of Arizona, Tucson, USA) talked about nebulin's functions in regulating thin filament lengths and **Elisabeth Ehler** (King's College London) presented her work on myomesin's and alpha-actinin's role in myofibril assembly. Both chair-women also provided a good example of time-management: an ordinary lab timer and an Austrian cow bell made sure that every single speaker of this session was on time! **Mathias Gautel** (King's College London) spoke about mechanosensory function of the M-band, **Nikos Pinotsis** (EMBL-Hamburg Outstation, Germany) about M-band protein structure and I presented my own work on non-sarcomeric Muscle LIM Protein.

After a well-deserved lunch break, the first poster session started. Lively discussions took place in front of the posters. All poster sessions were thematically matched with the oral sessions, a good chance to discuss presentations in more detail.

The talks continued on Sunday afternoon with session about '**Motor protein and myofilament structure**'. **John Squire** (University of Bristol) talked about myosin filament structure, followed by **Peter Knight** (University of Leeds), who focused on single alpha-helix domains in myosins, and how these can contribute to lever action. The last session of the day focused on '**Motor protein function**'. **Malcolm Irving** (King's College London) went into the details of myosin II motor mechanisms in skeletal muscle and **Claudia Veigel** (National Institute for Medical Research, London) talked about mechanical properties of non-muscle myosin V. After the "Motor protein" poster sessions, we all met for a well deserved and excellent dinner at Keble Hall.

The next morning started with the '**Cardiac Contractility**' session. **John Solaro** (University of Illinois at Chicago, USA) gave a talk about how Pak1 (p21 activated kinase) can regulate cardiac contractility. The second keynote talk was delivered by **Jon Kentish** (King's College London), who focused in altered contractile function of myocytes from hypertrophied human myocardium. **Martina Krueger** (University of Münster, Germany) spoke about how titin isoforms and phosphorylation may affect myocardial stiffness, and also the other speakers of the session focused on altered contractility associated with cardiomyopathies.

The subsequent session '**Cardiac disease**' continued with the topic "cardiomyopathies". **Hugh Watkins** (University of Oxford) gave an outstanding lecture on how critical we have to evaluate our genetic and functional findings when trying to understand the disease. He was followed by **Jolanda van der Velde**n (VU Medical Center, Amsterdam, Netherlands), who explored the role of altered myofilament protein phosphorylation in cardiac disease with the help of a unique pig model. **Sandford Bernstein** (San Diego State University, USA) presented a much smaller animal model, the *Drosophila* heart, in his talk for investigating the disease.

After another exquisite lunch at Keble Hall, we all reunited for the poster session. Afterwards, the first afternoon session '**Muscle Development and Redevelopment**' was opened by **Michael Schneider** (Imperial College London), who talked about cardiopoiesis. He was followed by an excellent talk by **John Sparrow** (University of York) showing the powerful genetic tools of *Drosophila* to investigate sarcomere development and muscular disease. **Vladimir Shirinsky** (Russian Cardiology Research Center, Moscow, Russia) talked about telokin functions in myofibrillogenesis, followed by **Geoffrey Goldspink** (Royal Free and UCL School of Medicine, London), who spoke about the role of IGF splice variants in muscle repair. The last talk of the session was delivered by **Pedro Velica** (University of Birmingham). In his excellent talk about the role of prostaglandin in muscle differentiation he told us that it might not be advisable to talk an aspirin when you have sore muscles – you always learn something useful at conferences!

The '**Smooth Muscle**' session was chaired by **Alexander Vorotnikov** (Moscow State University, Russia) and **Anders Arner** (Karolinska Institute, Stockholm, Sweden). The first scientist talked about the "Sympathetic control of postnatal remodelling and Ca^{2+}-sensitivity of arterial smooth muscle", the latter about smooth and striated muscles of zebrafish.

By the time the second poster session of the day ended, we were all very looking forward to the Gala Dinner - and we were not disappointed! At the Gala Dinner, the organisers also announced the Young Investigator Prizes: Ilya Nevzorov, Katja Gehmlich, Sabine van Dijk, Pedro Velica, Christiane Look, Zacharias Orfanos, Clare Gallon and Jaakko Sarparanta were awarded for their excellent oral or poster presentations at the conference. This new feature of the EMC provides not only a cheque; additionally the winners of the competition also get a chance to publish their work as an article in the *Journal of Muscle Research*.

The Tuesday morning began with a session on '**Skeletal Muscle Diseases**'. The first keynote speaker **Nigel Laing** (University of Western

Australia, Australia) gave an introduction into the topic, focussing on large Australian families with recessive gene mutations. He was followed by **Caroline Sewry** (Institute of Child Health, London), who discussed the diseases from a pathologist's point of view. **Dieter Fürst** (University of Bonn, Germany) presented his work on truncation mutation in Filamin C, which leads to protein aggregation myopathy.

The second morning session focused on '**Therapeutic strategies in muscle disease**'. **Dominic Wells** (Imperial College London) presented very promising results on potential treatments for Duchenne muscular dystrophy. Unfortunately, the second keynote speaker, **Fady Malik** (Cytokinetics Inc., USA), could not make it to the EMC, nevertheless he delivered a great – recorded – talk about small molecule screening for new cardiac drugs. **Houman Ashrafian** (University of Oxford) presented his ideas how energetic manipulation may be beneficial in heart disease, and **Marloes Langelaan** (Eindhoven University of Technology, Netherlands) spoke about the relevance of electrical stimulation during skeletal muscle differentiation *in vitro*.

After lunch and the last poster session, the afternoon session focused on '**Genomics and proteomics of muscle**'. **Jennifer van Eyk** (John Hopkins University, Baltimore, MD, USA) gave an example how to link proteomics and function of mitochondrial proteins. **Jeff Walker** (University of Wisconsin, Madison, WI USA) introduced us to very sophisticated mass-spectrometry methods, which he used to analyse troponin subunits. The following three talks gave nice examples of gene expression analysis at different levels: **Marcus Schaub** (University of Zurich, Switzerland) did transcriptome profiling to find cardioprotective mechanisms; **Clare Gallon** (Imperial College London, now UCL) presented a new method to analyse protein phosphorylation and **Houdini Wu** (Queen Mary University London) talked about ryanodine receptors expression during zebrafish embryonic development.

The very last session of the EMC2008, '**Muscle Plasticity**', was opened by a talk of **Boris Shenkman** (Institute of Biomedical Problems, Moscow, Russia) about calcium-dependent signalling pathways in muscle plasticity. He was followed by **Marco Sandri** (University of Padova, Italy), who talked about the role of Akt1/PKB activation in skeletal muscle hypertrophy. **Laurence Stevens** (Lille, France) explored other intracellular signalling pathways which regulate muscle atrophy and phenotype transitions. **Martin Flück** (Manchester Metropolitan University, UK) highlighted the functions of costameres for myofibre

differentiation and force transmission. The last talk of the EMC2008 was given by **Frederik Lauritzen** (University of Oslo, Norway), who presented his work on the translocation of small heat shock proteins after eccentric exercise in human volunteers.

I must admit that I was really exhausted after three days packed full with muscle science (the "Oxford fatigue syndrome"), but I really enjoyed it. The EMC2008 was a great conference: I had the chance to talk to many scientists, to discuss their and my work, and I am sure that several collaborations will evolve from this meeting. I would like to thank the British Society for Cell Biology for giving me the opportunity to attend this meeting.

The next European Muscle Congress will take place in Lille, France, in September 2009.

Katja Gehmlich
Centre for Cardiology in the Young (CITY), Department of Medicine, University College London

Telomeres and the DNA Damage Response

15–19 September, 2008; Villars-sur-Ollon, Switzerland

This five day meeting was part of the EMBO conference series. It was held in the picturesque town of Villars-sur-Ollon in the Swiss Alps. The meeting focused on the structure and function of telomeres in different organisms.

The oral presentations were divided into seven themed sessions, with four or five presentations in each session. The opening session started after dinner in the evening of the first day. The themes of the sessions were: Telomere replication and length regulation, Chromatin structure and telomere structure, Consequences of telomere dysfunction, Processing of DNA double strand break, Telomere proteins and protein modifications, and DNA damage response and telomeres. In addition to the oral presentations, 79 posters were presented during two poster sessions.

The first session included a talk by **Helder Ferreira** (Friedrich

Miescher Institute, Switzerland) about the relationship between telomerase-mediated telomere maintenance and the subnuclear positioning of telomeres in budding yeast. First, it was nice to be reminded that chromosome ends (telomeres) have an important role in protecting chromosomes and maintaining genome integrity. Telomeres themselves are maintained by the reverse transcription action of the telomerase complex. In budding yeast, the highly conserved yKu protein binds telomeres and functions in telomere maintenance by promoting telomerase action. The yeast telomeres localize near the nuclear envelope, and perinuclear localization of telomeres is also mediated by yKu. Data presented in Ferreira's talk showed that the interaction between yKu and the core subunit of telomerase (Est2p) is crucial for localizing telomeres to the nuclear periphery. The data also showed that a conserved inner nuclear membrane protein (Mps3p) acts as a membrane anchor for yKu-mediated telomere localization pathway. Additional experiments showed that the spatial organization of telomeres within the nucleus has an impact on telomere maintenance. Ferreira's results therefore suggest that maintenance of telomeres by telomerase requires proper telomere localization which may depend on telomerase itself. I presented my talk on the effect of DNA replication on telomere localization in the second session that was held in the morning of the second day.

Also in the first session, **Yuji Chikashige** (Kobe Advanced ICT Research Center, Japan) presented data on the mechanisms of telomere localization during meiosis in *S. pombe*. Telomere localization dynamics during meiosis appear to be conserved across eukaryotes. In many organisms, during meiosis telomeres spatially congregate to form a large cluster known as the 'bouquet' arrangement. The formation of the bouquet is important for homologous chromosome pairing and progression of meiosis. Yuji Chikashige and colleagues have used *S. pombe* to examine which proteins are required for bouquet formation. They showed that Bqt4 is an inner nuclear membrane protein which is required for anchoring of telomere to the nuclear envelope. In absence of Bqt4, telomeres are released from the periphery and consequently fail to from the meiotic bouquet.

Maintenance of telomere is crucial for genome stability and aberrant regulation of telomere length can cause tumorigenesis. **Lea Harrington** (University of Edinburgh) and colleagues have created tumorigenic cell lines from human kidney cells to study the effect of telomerase loss in a tumour cell model. The data presented provide a clear link between tumorigenic potential and telomere length. To understand how telomerase-dependent extension of telomeres is regulated, several groups have used yeast as a model system to study how the regulators and components of the telomerase complex load on telomeres. **Alison Bertuch** (Baylor College of Medicine, US) showed that yKu must load directly onto telomeres in order to mediate its telomeric functions. Therefore, Bertuch *et al*. propose a model whereby there is ordered loading of telomeric proteins onto newly synthesised telomeric ends. **Katherine Friedman** (Vanderbilt University, US) presented data on another telomerase component Est1p and how the different regions of this protein mediate its multiple roles in telomerase assembly in budding yeast. **Toru Nakamura** (University of Illinois at Chicago, US) presented his work on studying the cell cycle-dependent binding of different telomeric proteins in fission yeast. Using chromatin immunoprecipitation (ChIP) assays Nakamura *et al*. observed that telomeres undergo changes in protein composition long before DNA polymerases and telomerase are recruited to telomeres. An interesting aspect of this approach is that they are now able to study how mutations in various factors affect the timing of telomerase recruitment to telomeres. While budding yeast and fission yeast have been extensively used as model organisms to study telomere maintenance, **Jan Karlsedar** from the Salk Institute, US suggested that *C. elegans* is a primordial and powerful model system to study telomere length regulation in cancer. Karlsedar and colleagues have shown that in the worm the protein CeOB1 functions in regulating telomere length *in vivo*.

Since abnormal telomere length regulation can cause cancer, a telomerase inhibition-based therapy might hold potential for cancer treatment. **Chantal Autexier** (McGill University, Canada) presented a talk on an alternative approach for cancer therapy that consists of targeting the integrity of telomeres rather than telomerase activity. Autexier and colleagues have validated an approach that consists of destabilizing telomeres with a mutant human telomerase RNA (hTR) template that causes synthesis of mutant telomere sequence. Data presented showed that four different cancer cell lines that express a mutant hTR exhibit increased sensitivity to chemotherapeutic drugs. Current work involves analyzing the mechanisms implicated in the increased sensitivity of these cells to drugs. Finally, mutations in the telomerase complex have been implicated in Dyskeratosis congenita, aplastic anaemia, and familial pulmonary fibrosis. To investigate whether mutation in telomerase predisposes patients to haematopoietic cancer, **Peter Lansdrop** (B.C. Cancer Research Centre, Canada) and colleagues examined genes encoding the telomerase components in a variety of blood cancer patients and in control individuals. Based on the obtained data, Lansdrop *et al*. propose that individuals carrying certain alleles have shorter telomeres, predisposing them to cancer.

Overall, the meeting was a great opportunity to learn about the mechanisms that function in maintenance of chromosome ends. To understand these mechanisms, a number of groups are using model organisms such as *S. cerevisiae* and *C. elegans* to analyze the function of telomere binding protein and also to elucidate the pathways that cause abnormal telomere length. The knowledge obtained from the model organisms has been useful in understanding the abnormal maintenance of telomere in cancer cells. A better understanding of how telomeres are maintained in normal and censer cells can potentially help researchers develop anti-cancer therapies.

I am extremely grateful to the BSCB for awarding me the Honor Fell Travel award, whereby I was able to meet the leading researchers in the field of telomere biology.

Hani Ebrahimi
Institute of Medical Sciences, University of Aberdeen

Frontiers in Cell Migration: From Mechanism to Disease

16–18 September 2008; NIH, Bethesda, USA

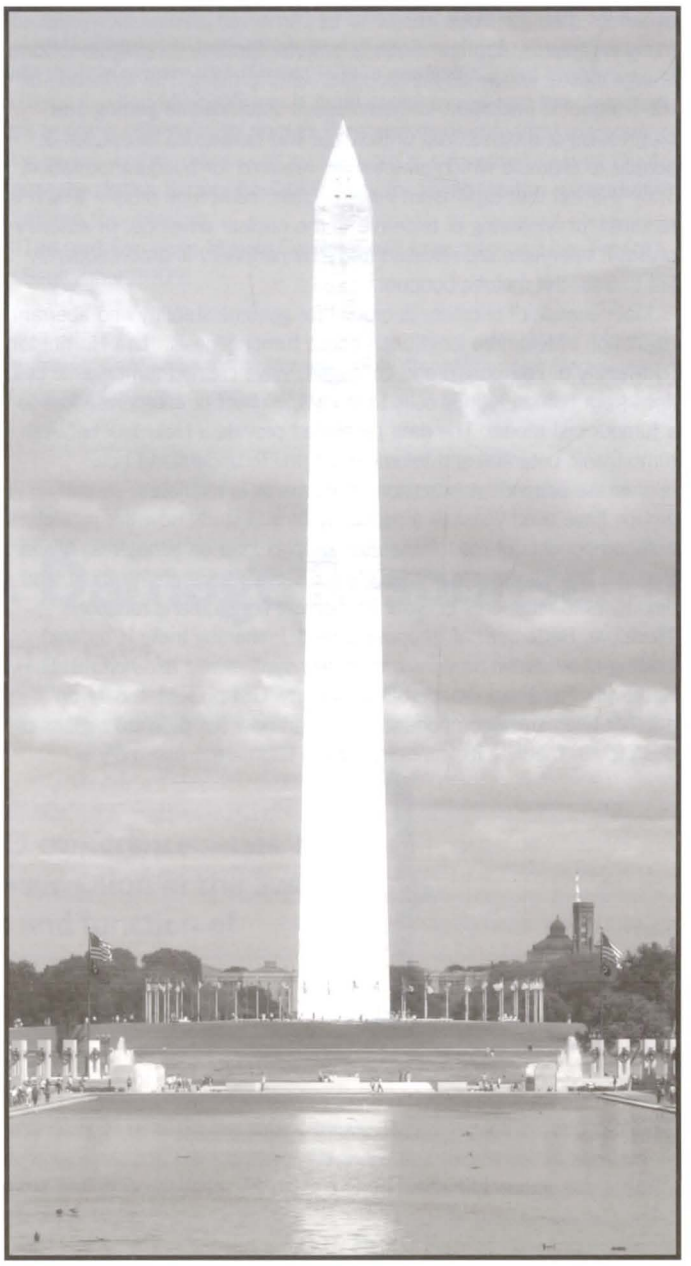
Leaving behind another miserable, wet English summer, we journeyed west to sunny Washington D.C. This conference was organised by the Cell Migration Consortium with Rick Horwitz and Tom Parsons (University of Virginia, USA) at the helm and aimed to cover all aspects of cell migration from "basic mechanisms to how aberrations in migration impact human disease".

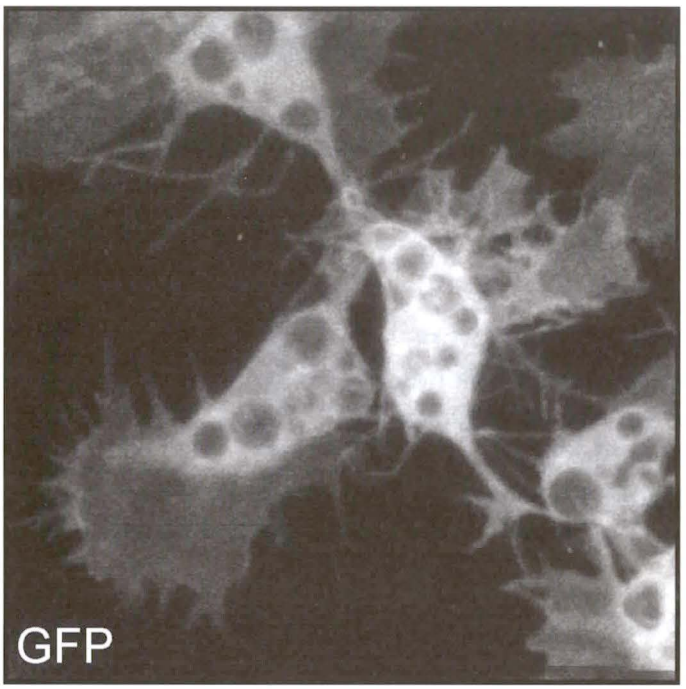
One of the central aims of the Consortium is to develop new technologies and methodologies to study this intriguing area and many talks showcased these advances. The research on show ranged from 1D cell culture, through to *in vivo* models of developmental and pathogenic migrations, and on into the world of *in silico* mathematical modelling.

Several talks revealed the cutting edge techniques deployed to study cell migration, in particular live imaging and the corresponding sensors required for the localisation studies of molecules involved. **Martin Schwartz** (University of Virginia, USA) presented a FRET-based mechanosensor enabling visualisation of mechanical forces during migration, using mTFP1 and Venus fluorescent proteins separated by an entropic spring. This mechanosensor has been inserted between the vinculin head and tail, which become separated when vinculin is activated. When cells were plated onto fibronectin the sensor and tail-less constructs gave similar FRET signals, but the full-length vinculin sensor had greatly reduced FRET, implicating separation of the donor and acceptor fluorescent proteins. It was suggested that this mechanosensor could be used in other proteins found within adhesion complexes such as talin.

Klaus Hahn (University of North Carolina, USA) described the generation of a photoactivatable form of the small GTPase Rac1 (PA-Rac1), which was used to investigate the real-time effect of Rac1 activation on lamellipodial protrusion. By fusing Rac1 with the LOV2 domain of Avena sativa (oat) phototrophin, he created a fusion protein, which undergoes a transient conformational rearrangement upon exposure to blue laser light, activating the GTPase. PA-Rac1 could be readily expressed in mammalian cells and activated in a spatially and temporally restricted manner to induce lamellipodial protrusion. An impressive movie was presented of a cell whose path of migration was controlled by repeated activation of PA-Rac1 at the cell's front.

It is well established that the morphology, speed and directionality of cells migrating within 3D environments differs significantly from migration on 2D substrates and **Kenneth Yamada** (NIDCR/NIH, USA) addressed this elegantly with a talk on the influence of dimensionality on the migratory characteristics of cells. His group have used laser micropatterning to study cell migration in a quasi-1D environment along thin lines of matrix protein. Interestingly, they found that many aspects of cell migration in 1D paralleled observations made in 3D rather than 2D systems. One potential explanation could be that a thin line of matrix protein more closely resembles protein fibres that cells migrate along within 3D environments. Therefore, data acquired from 1D studies may better represent *in vivo* behaviour than that





acquired using classical 2D culture.

Another recent conundrum in cell migration research, the ability of *Dictyostelium* to migrate in the absence of a polarised gradient of phosphatidylinositol-3,4,5-triphosphate (PIP3), was explained by **Peter Devreotes** (Johns Hopkins Medical School, USA). It seems that in the absence of elevated PIP3 at the leading edge, cAMP-induced signalling can also activate two PKB homologs via the TorC2 complex. These PKBs then activate downstream targets including talinB; in the absence of PKBs or TorC2 chemotaxis is impaired. A similar pathway may operate in neutrophils, as some PI3K null neutrophils still chemotax.

The asymmetric distribution of phosphatidylinositides is but one example of polarity within migrating cells and talks by **Irina Kaverina** (Vanderbilt University, USA) and **Diane Barber** (University of California, USA) examined the roles of microtubules and intracellular pH gradients, respectively. Microtubules, utilised for intracellular trafficking and cell motility, originate from the centrosome located behind the nucleus and radiate equally in all directions within the cell. **Irina Kaverina** presented data indicating the presence of an asymmetric microtubule network originating from the Golgi radiating from in front of the nucleus towards the leading edge. The formation of this asymmetric network is independent of the centrosome, but requires CLASP protein and a membrane-associated scaffold protein, GCC185. This Golgi-associated microtubule network is required for directional migration. Given the polarised nature of migrating cells it is possible to have areas of differing environments within the cell: **Diane Barber** discussed the roles of pH sensors at various stages of directed migration. The regulation of Cdc42 by its interaction with guanosine exchange factors (GEFs) is pH-sensitive and modulates cell polarity. pH change alters the binding affinity of cofilin for actin barbed ends leading to changes in actin polymerisation and alterations in membrane protrusion. The cytoskeletal protein talin has pH-dependant binding sites with a carboxyl-terminal site altering its actin binding potential, whilst an N-terminal glutamic acid residue in talin appears to regulate adhesion turnover. This evidence led to the suggestion that the increased pH found in tumours could greatly influence metastasis, suggesting the use of pH-dependent drugs as a way forward in cancer therapy.

A number of siRNA screens have recently been undertaken by Consortium members to identify new molecular players in cell migration; **Joan Brugge** (Havard Medical School, USA) presented data from a high throughput siRNA screen to knockdown 1081 human genes predicted to influence cell migration. *In vitro* wound healing assays in MCF-10A cells highlighted 34 genes that accelerate epithelial cell migration and 32 that impair migration, with 42 of these genes not previously associated with migration, providing novel genes for further study.

A large swathe of talks investigated migration *in vivo*, with cancer cell invasiveness a particular focus. **Patricia Keely** (University of Wisconsin, USA) described cancer cell invasion into aligned collagen matrices. Using collagenase-resistant mice, her lab demonstrated that tumours are more likely to form and invade denser collagen. Using *in vitro* explant experiments, the alignment of collagen perpendicular to the tumour-explant boundary was shown to promote local invasion of mammary epithelial cells. The small GTPase Rho is important for collagen alignment in this model and this is an early step in the invasion process, facilitating 3D migration. **Peter Friedl** (Radboud University, Netherlands) showed that collective migration of tumour cells requires tissue micro- and macropatterning and is dependent on protease function, whereas single cell migration is independent of protease function. Using intra-vital multiphoton microscopy of tumour spheroids implanted into live mice, he demonstrated that collective cell migration occurs *in vivo* and that cells align along and wrap around pre-existing blood vessels during invasion. Adding further weight to the relevance of these studies, he recently found this phenomenon reiterated in fibrosarcomas. **Margaret Frame** (University of Edinburgh) discussed the use of Src and FAK inhibitors as anti-invasive drugs. The Src kinase inhibitor AZD0530, currently in clinical trials, shows a robust inhibitory effect upon epithelial-mesenchymal transition. Studies are ongoing to image the dynamics of E-Cadherin during tumour cell dissemination *in vivo*.

Cell migration is also central to developmental and immunological processes and the final session of the conference concentrated on these topics. The use of genetically tractable organisms enables screening for novel genes regulating migration and invasion. **Denise Montell** (Johns Hopkins Medical School, USA) discussed results from genetic screens of border cell migration in *Drosophila*. For example, hindsight mutant border cells fail to migrate due to elevated E-cadherin levels and increased cell-cell adhesion. Furthermore, when the human homolog of Hindsight (RREB1) was knocked down by siRNA, MCF-10A cells failed to close *in vitro* wound scratches. **Paul Martin** (University of Bristol) took us through several *in vivo* models his lab uses to visualise wound healing and inflammatory responses, moving from zebrafish, where he demonstrated how the actin nucleation promoting factor WASp plays a crucial role in steering macrophages to fin wounds, through to utilising *Drosophila* to tease out the roles of Rho GTPases in the recruitment of embryonic macrophages (haemocytes) and onto mouse studies of wound repair. This last model revealed that macrophages recruited to epithelial wounds stimulate fibroblasts to produce a protein called osteopontin, which exacerbates fibrosis and retards repair; reducing osteopontin levels at wounds may therefore represent a novel anti-scarring therapy. Another crucial step in inflammatory responses is trans-endothelial migration (TEM); in a talk containing many beautiful and enlightening electron micrographs of T cells during this process, **Ronen Alon** (Weizmann Institute, Israel) outlined how both shear forces and chemokine signalling to integrins are required for TEM. In the absence of shear flow resting primary lymphocytes fail to undergo TEM, whereas shear flow triggers increased adhesion and the formation of protrusive structures, leading to TEM.

Hopefully this report gives a flavour of the breadth of current cell migration research on show in Washington. We are grateful to the BSCB for our Honor Fell Travel Award Grants that enabled us to attend this meeting and also the conference organisers. There were also many interesting posters, the abstracts of which are available at **www.cellmigration2008.org**. The Consortium website (www.cellmigration.org) includes many resources, including some of the siRNA screens presented during the conference.

Kath Clark (University of Leicester)
Iwan Evans (University of Bath)
Jonathan Howe (University of Leicester)
Samantha King (Kings College London)

The Kidney: Development, Repair and Regeneration

17-19 September 2008. Liverpool, UK

This conference, organized by the European KIDSTEM network, brought together scientists and clinicians in the field of kidney development, stem cell biology, nephrology and tissue engineering to present their latest findings and discuss the feasibility of developing stem cell therapies for the treatment of kidney disease.

The first plenary talk, which opened the **Stem Cells and Renal Regeneration** session, was given by **Melissa Little** (University of Queensland, Australia), who asked a very important question: do we need stem cells to regenerate kidney? She highlighted the need for alternative approaches to treating kidney disease and outlined the feasibility of potential regenerative therapies. She also provided information about the latest findings of her group, showing that microphages play a role in ureteric bud branching and nephrogenesis. The next speaker, **Gregory Dressler** (University of Michigan, USA), explained the influence of the canonical WNT-signalling pathway on kidney development, focusing on how this pathway interacts with two very important kidney development genes: Pax2 and Six2. **Takashi Yokoo** (Jikei School of Medicine, Japan) presented a very interesting and novel method for culturing organs as complex as kidney, *de novo* from human mesenchymal stem cells (hMSC). This method could make it feasible, in the future, to produce humanized organs and might transfer our thinking from RE-generative medicine to NEO-generative medicine. **Qais Al-Awqati** (Columbia University School of Physicians and Surgeons, USA) spoke about the typical characteristic of the stem cells niche and showed that within kidney, the papilla is such place, and contains a high number of BrdU positive (slow cycling) cells.

An outstanding plenary talk by **Jamie Davis** (University of Edinburgh, UK) opened second day of the conference, which was dedicated to **Kidney Development**. He pointed out that looking for appropriate stem cells sources to treat kidney disease is an important process, but once we have them, other obstacles may appear. Important issues that would need consideration include the requirement for properly organized nephrons that would be correctly orientated in the organ. Although we know quite a lot about kidney development and stem cells themselves, developing stem cell based therapies to treat kidney disease is still challenging area for scientists. **Seppo Vainio** (University of Oulu, Finland) presented data showing how growth factors and their antagonists, control kidney development, and using knock-ins and knock-outs of the key developmental genes, Wnt4, FGF8 or Pax8 elegantly illustrated the role played by these genes in the kidney organogenesis. His presentation was followed by two interesting talks focusing on role of Wt1 in kidney development. **Colin Miles** (Institute of Human genetics, Newcastle, UK) showed novel data showing the role of Wt1 in Denys-Drash syndrome, and Peter Hohenstein (MRC Human Genetics Unit, Edinburgh, UK) showed that the Wt1 dependent mesenchymal-to-epithelial transition, which is required to initiate nephrogenesis, is mediated by Wnt4.

The afternoon session began with **Benedetta Busolatti** (University of Torino, Italy) who talked about resident stem cells in the adult kidney. She highlighted difference between renal stem cells derived from normal adult kidney with those from polycystic kidneys (PKD), and showed that stem cells from the latter had an increased resistance to apoptosis and had reduced differentiation potential. **Giuseppe Remuzzi** (Mario Negri Institute for Pharmacological Reserch, Bergamo, Italy) delivered an outstanding plenary talk and gave an overview of the progress that had been made in the treatment of kidney disease, highlighting the breakthroughs that had been made using pharmacological agents. **Richard Poulsom** (London Research Institute, UK) then focused our attention on the cell fusion problem. Fusion is quite common in nature and it is now well recognized that following transplantation, some stem cells fuse with those of host, generating aneuploid cells that could form tumours. **Francesco Frassoni** (University of Genoa, Italy), presented interesting data showing how mesenchymal stem cells have an immunosuppresive effect and can help prevent graft versus host disease following kidney transplantation.

On the last day of the conference, the focus turned to the field of **Biomaterials and Tissue Engineering**. The plenary talk was given by **James Yoo** (Wake Forest University, North Carolina, USA) who presented fascinating data showing how biomaterial scaffolds can support the development of nephrons from a dissociated population of stem cell. His talk was complemented by **Matthias Lutolf** (Institute of Bioengineering, Lausanne, Switzerland) who presented interesting data showing how bioengineering strategies can be used to construct artificial stem cell niche that can help to understand adult stem cell regulation. **Shimon Uterman** (John Hopkins University, Baltimore, USA), then showed the importance of understanding the mechanisms regulating tissue development on scaffolds, and presented novel data showing how stem cells can be used to promote musculoskeletal repair. **Rachel Williams** (University of Liverpool, UK) explained how biomaterial scaffolds need to have specific physiochemical and functional properties in order to be suitable for transplantation, and then went on to show some exciting results how novel biomaterials could support the propagation of retinal pigment epithelial cells that could potentially be used for the treatment of age-related macular degeneration.

The conference was a great success, bringing together scientists interested in stem cells of all kinds in the context of kidney development and regeneration, supported by new biotechnology. I would like to thank to British Society for Cell Biology for their support and take this opportunity to recommend the forthcoming 2nd KIDSTEM Conference which will take place on 29-31 July 2009 in Edinburgh (for further information, go to: www.kidstem.org).

Aleksandra Rak-Raszewska
University of Liverpool

Joint Meeting of the British and Spanish Developmental Biology Societies

24–27 September 2008; Seville, Spain.

This four day meeting was held at the Hotel Al-Andalus Palace, located just a few miles outside the centre of Seville and just over the road from the Estadio Manuel Ruiz de Lopera. The conference attracted approximately 300 researchers with over 40 oral presentations given over 10 sessions.

I arrived late on the 23rd September, the day before conference registration began, with two colleagues, which allowed us several hours the next day to wander around and explore the beautiful city of Seville. Wednesday evening began with registration before the opening lecture, by **Angela Nieto** (Inst. de Neurociencias, CSIC/Univ Miguel Hernández Alicante, Spain) on 'The Snail gene family in embryonic development and adult tissue homeostasis' and welcome cocktails later in the evening. This was a good time to talk to other scientists I had never met before and to exchange thoughts and ideas before the conference really got started.

From Thursday onwards, presentations were organised into sessions of related talks, two 'main' talks and two 'short' talks per session, with schedules running from early morning until evening before a final session on Saturday afternoon. On Thursday and Friday morning and afternoon sessions were separated by an excellent three course lunch, with a little time left to spend in the Seville sunshine. The talks were of an extremely high calibre, with many being inspirational to any young scientist.

Thursday morning consisted of several interesting and varied talks in the '**Stem Cells**' and '**Model systems for human pathologies**' sessions. The human pathologies session contained one of my favourite talks of the conference titled "Cardiac injury induces myocardial marker expression in epicardially-derived cells from cultured mouse embryonic hearts" by **Ramón Muñoz-Chapuli** (Univ. of Málaga, Spain). This talk discussed epicardially derived cells in a number of species, though focussed primarily on the mouse, providing an interesting view of the behaviour and changes in gene expression patterns of epicardially derived cells *in vivo* and in culture. 'Functional genomics and evolution' and 'Systems biology' sessions in the afternoon finished off a quite varied and insightful day of seminars.

There was also an interesting talk on Thursday evening during one of the poster sessions, "On the conception, gestation and parturition of a scientific manuscript: two protocols for writing better papers" by **David J. Fogarty** (*Int. J. Dev. Biol.* Managing Editor). This was a very useful talk for anyone writing a paper, or even their Ph.D. thesis. It was filled with many interesting examples of how 'elite' performers get to (and maintain) a high standard of performance and how this can relate to your own scientific research. I particularly enjoyed the part about how we should celebrate every victory, no matter how big or small!

Friday morning began with an '**Organogenesis and morphogenesis**' session, which appeared to be of particular interest for scientists who use *Drosophila* as a model organism and was subject to much interest. This was followed by a '**Cell proliferation and apoptosis**' session, where the only seminar on plant development was to be found! Friday afternoon consisted of '**The polarised cell in development**' and '**Migrating cell and folding tissues**' sessions. The former session contained another of my favourite talks, by **W. James Nelson** (Univ. de Stanford, California, USA) on the cytomechanics of cell-cell adhesion and differentiation. I found his description of actin dynamics and its potential regulation by α-catenin particularly interesting and insightful as was the observation that α-catenin may be as useful a marker as E-cadherin in determining the prognosis for cancer patients.

The conference dinner took place late on Friday evening and turned out to be both an interesting social event, with some wonderful Spanish food, wine and culture on display and yet another opportunity to meet new people and discuss science.

Poster sessions took place over two hour sessions, late evening on both Thursday and Friday. I presented a poster entitled 'Med31 in required for mouse development', which showed most of my more interesting data from two years of Post-Doctoral research. It was an excellent opportunity to explain my work, discuss it with some very intelligent and thought provoking scientists and to do some valuable networking. These sessions also further demonstrated the wide variety of exciting and high quality research undertaken by conference attendees.

Saturday was the shortest of the three days of talks, consisting of '**Cell communication**' and '**Architecture of the nervous system**' sessions, which were a little quieter as some people had already had to leave to catch their flights home. These were followed by the EMBO talk by **Christine Holt** (University of Cambridge), titled 'RNA-based mechanism of directional steering in growth cones', and afterwards the conference finished, as it began, with cocktails.

Overall, this was a fantastic meeting which gave me an opportunity to meet many scientists from a wide variety of research backgrounds. It also gave me valuable feedback for my research and helped me to determine the direction of my future career. I would recommend this type of meeting to anyone interested in Developmental Biology and I am very grateful to the British Society for Cell Biology for its generous contribution from the Honor Fell travel fund that allowed me to attend the conference.

Michael Risley,
Faculty of Life Sciences, University of Manchester

EMBO workshop on chromosome segregation: Centromeres & kinetochores

27 September – 2 October; Archachon, Bordeaux, France

Robin Allshire (University of Edinburgh), Jean-Paul Javerzat (I.B.G.C. Bordeuax, France) and Gary Karpen (Department of Molecular and Cell Biology, Berkeley, USA) took on the responsibility of organizing this workshop and did a great job. The location next to the sea in a quite French town was a nice setting for stimulating scientific discussions.

The meeting opened with discussion of centromeric DNA, and **Karen Hayden** (Duke University, USA) presented data on the sequences of all human centromeres and CENP-A associated sequences. The meeting moved on to look at the role of CENP-A deposition. Work from **Robin Allshire**'s lab revealed that the role of RNAi in creating heterochromatin could be bypassed by tethering the histone methyltransferase Clr4 to chromatin. **Gary Karpen** gave a talk on the role of histone H2Av in *Drosophila* and showed that it is part of centromeric chromatin. Using the SNAP-tag technology it was shown that H2Av is required for assembly of newly synthesized CID (CENP-A in *Drosophila*). **Alison Pidoux** (University of Edinburgh) presented data on the role of fission yeast Scm3 in CENP-A loading. She showed that Scm3 could bind both Mis18 and CENP-A but that the localization of Scm3 to centromeres is independent of CENP-A. She proposed a model where Scm3 is recruited to centromeric DNA late in mitosis and assist in the loading of CENP-A into chromatin. **Don Cleveland** (Ludwig Institute for Cancer Research/UCSD, USA) presented elegant purifications of tagged CENP-A from human cells and isolated a complex consisting of nucleophosmin 1, histon H4, CenCAF and CENP-A. He showed that CenCAF is a new histone chaperone responsible for loading CENP-A in G1 and that CenCAF recognizes the centromere targeting domain (CATD) of CENP-A. **Barbara Mellone** (Lawrence Berkeley National Laboratory, USA) had performed a genome-wide screen in *Drosophila* S2 cells and scored for absence of CID foci. The screen revealed that Cenp-C and Cal1 are required for CID loading and it was shown that the 3 proteins exist in a complex. **Lars E.T. Jansen** (Instituto Gulbenkian de Ciencia, Portugal) used the SNAP-tag technology to address when newly synthesized CENP-A is loaded and elegantly showed that this occurred in late mitosis/G1 and was dependent on the hMis18/KNL2 complex. The hMis18/KNL2 complex is required for loading but not maintenance of CENP-A.

Following the sessions on centromeres and CENP-A, the meeting focused on the composition and architecture of the kinetochore and its connection to the spindle assembly checkpoint. **Alvaro Tavares** (Instituto Gulbenkian Ciencia, Portugal) had elegantly purified mitotic kinetochores from *Drosophila* embryos or cultured cells and performing mass spectrometry on these preparations he had identified 99 proteins of which 26 corresponds to previously uncharacterized genes. The initial characterization of 19 of these revealed that upon RNAi the chromosomes in the cells misaligned/mis-segregated and showed kinetochore localization. **Todd Stukenberg** (University of Virginia Medical School, USA) presented data the Ndc80 protein and elegantly showed that a basic N-terminal tail of the protein was required for microtubule binding *in vitro*. An RNAi and rescue experiment showed that cells expressing a Ndc80 protein without its basic tail formed a structurally intact kinetochore but this kinetochore was unable to bind microtubules. Todd further went on to show that an acidic tail on microtubules was needed for binding Ndc80. Helder Maiato (University of Porto, Portugal) had investigated the existence of a spindle matrix surrounding the mitotic spindle and in particular focused on the nuclear-pore complex protein Tpr that forms a structure surrounding the mitotic spindle. Helder showed that Tpr forms a conserved complex with Mad2 and that Tpr is needed for Mad2 binding at unattached kinetochores.

Arshad Desai (UCSD School of Medicine, USA) had analyzed the role of dynein at the kinetochore by focusing on the RZZ complex and an associated protein SPDL-1. He showed that the RZZ complex controls load-bearing attachments between kinetochores and microtubules and that this is dependent on dynein localized via SPDL-1. **Conly Rieder** (Wardsworth Center, USA) gave a very energetic talk on the role of microtubules in mitotic slippage. He compared the rates of slippage in cells treated with drugs that prevented microtubule assembly to that of cells treated with drugs that does not block microtubule assembly but blocks kinetochore-microtubule interactions. He found no difference in the rate of mitotic slippage between the two types of drugs and thus concluded that mitotic slippage rate is independent of microtubule assembly level. **Patrick Meraldi** (ETH Zurich, Switzerland) had analyzed the role of Bub1 in the spindle assembly checkpoint and in chromosome congression. He showed that the role of human Bub1 in spindle assembly checkpoint signalling and kinetochore-microtubule attachments regulation could be functionally separated. Deletion of the kinase domain of Bub1 only has a minor effect on the spindle assembly checkpoint but a dramatic effect on chromosome congression. In contrast a conserved motif between amino acids 458-476 is needed for the checkpoint and recruitment of Mad1 and Mad2 checkpoint proteins to the kinetochore. Finally the binding of Bub1 to Bub3 was important for both aspects of Bub1 function. **Kevin Hardwick** (University of Edinburgh) had found that Bub3 and Dis2 (PP1 phosphatase) in fission yeast are required for efficient silencing of the spindle assembly checkpoint. **Sue Biggins** (Fred Hutchinson Cancer Research Center, USA) had used minichromosomes to purify budding yeast kinetochores and then identified proteins by mass spectrometry. I addition to well-known components of the kinetochore they identified Fin1 a Glc7 (PP1 phosphatase) regulatory subunit. In addition to its binding to Glc7, Sue also showed that Fin1 can bind 14-3-3 proteins and that the binding to 14-3-3 proteins is dependent on CDK1 phosphorylations.

The binding of 14-3-3 proteins to Fin1 prevents the binding of Glc7 and controls the Fin1-dependent spindle localization of Glc7. A version of Fin1 that cannot bind to 14-3-3 proteins leads to the premature localization of Glc7 to the spindle and a defect in spindle checkpoint activation. Sue proposed that Fin1 controls the Glc7 mediated dephoshorylation of Ipl1 substrates involved in checkpoint activation. Besides the talks the meeting featured some great poster sessions and French wine in abundance.

Jakob Nilsson
Gurdon Institute, Cambridge

European Respiratory Society: The annual congress

4–8 October 2008; Berlin Germany

I arrived at Schonefeld airport on Saturday 4th October morning with one of my colleagues, where the airport is located in the South East Berlin on the other side of the conference venue, the Messe Berline. My PhD is focused on the mechanisms and role of mast cell mediators, tryptases, in asthma, so this conference was a great opportunity for me.

From Sunday morning until Wednesday early afternoon, the schedule was jam-packed with symposium, oral talks and in-between I had to choose from about 200 thematic posters and E-communication posters each day. Each E-communication session held contained about 20 posters in a big hall, it provided me with possibility to meet and discuss with other scientists from my area of research and from clinical relevant field as well direct communication with authors of relevant work to mine, where sharing ideas were the key tool of that kind of sessions.

There was a challenge to choose from very close parallel running sessions, but I tried to cover the most relevant to my work. On Sunday, the start was with one important symposium, scientific year in review: airway remodelling with a talk by **Voelkel** (Richmond, USA) on COPD and its autoimmune part and how susceptibility would contribute more toward having the disease. This talk was a perfect prelude to many other interesting oral talks in the field, where in the following session Asthma: from clinical pattern to genetic background, a talk by **Von Mutius** (Munich, Germany) about the interactions of genes and environment in asthma and how it could provide a new strategy to understand the aspect of having different phenotypes of asthma.

Monday started with my E-poster, Alpha-tryptase haplotype: association with asthma and allergy susceptibility; the chair gave us the chance to give our presentation using the main screen in an oral brief talk and then questions by the attendants

After that, a symposium about -Omics and systems biology included a talk by **Ratko Djukanovic** (Southampton, UK), about the genetic understanding of epithelial cell function, which is the gateway to most of the lung diseases. The talk was a clear message of the importance of understanding the genetic role in the pathogenesis of asthma and how important to have a consistent tool to explore that role. Following that was a presentation on how mast cell activation induces dendritic cell migration following allergen challenge, by **Sebastian Reuter** (Mainz-Germany). In the same day a poster was presented by **Elena Bargagli** (Siena, Italy) about the analysis of tryptase in serum and bronchoalveolar lavage of sarcoidosis patients.

Tuesday started early with session on air pollution. A talk by **Stephen Holgate** (Southampton, UK) highlighted the importance of epithelial cell function in respiratory airways. He presented different studies confirming that dysfunction related to air-pollution and how that applied to asthma. Other presentations looked at the mechanisms and impact of severe asthma, including discussion of the involvement of toll-like receptor 4 in fatal asthma by **Diogenes S. Ferreira** (Sao Paulo, Brazil) and of the association of IL-18 expression by **Yuki Sakazaki** (Kurume, Okinawa, Japan). Two posters gained my interest, one group presenting their studies about mast cell densities difference in endobronchial biopsies in small airways and whole lung by **Mark Carroll** (Aarthus, Denmark), and another about the increase in mast cell number in COPD and cyctis fibrosis of the lung, by **Cecilia Andersson** (Lund, Sweden).

Wednesday was the last day in the conference. A symposium about the epigenetic modification in lung disease included a possible contribution of epigenetic mechanisms in COPD; in a parallel session, the question of whether asthma should indeed be considered an allergic disease took place. Here, one of the presenters, **Seif Shaheen** (London, UK), spoke about the hard question of genes modifying environment or vice versa; he gave different study models exploring this but the answer still

wasnot clear. More genetic work was presented by **Bianca Beghé** (Nottingham,UK), notably the association of polymorphism of interleukin-13 receptor genes with atopy and lung function in asthmatics.

That was the last of my attended talks, as I had to leave to back up my luggage and then to the airport to go back home after a fascinating conference, which gave me the opportunity to meet and discuss with relevant scientists my research and beyond. I'm very grateful to the BSCB for giving me the chance to attend such a big conference and meet people from around the world. This was valuable to me with lots of ideas to apply in my research, and I am hoping to have that chance to attend similar meetings in the future.

Ahmed Abdelmotelb
Immunopharmacology group, School of Medicine, University of Southampton

Can epigenetics influence reprogramming and metastatic progression?

6–9 October, 2008; Banz Monastery, Bad Staffelstein, Germany

The first day of the workshop started on 6th October in the early evening with the Welcome Lecture being cancelled due to the delayed schedule. However, the welcome feast was fantastic and warming. Since I have never been to Germany (even Europe) before, I was impressed by the dishes and beers!

In the second day session, the talks in the morning were about stem cells and niches in development and cancer and those in the afternoon were related to accelerators and brakes in tumourigenesis. **Dr. Frank Buchholz** (MPI Dresden, Germany) presented his work investigating Oct4 modulators in mouse embryonic stem cells using a genome-wide RNA interference technique by which the gene expression can be knocked down in a more specific fashion. This new technique drew huge attention and it has been submitted to patent application. After treating mouse GFP embryonic stem cells with RNAi, the expression profiles of Oct4-regulated genes were examined by quantitative PCR. They found the Paf1 gene is required for maintaining Oct4 and Paf1 is down-regulated during embryoid body formation. Knocking down the CTR9 gene, which belongs to the Paf1 family, would give rise to lineage-restricted differentiation of embryonic stem cells.

The talks in the third day were related to migration and invasion of the cells at distant sites and epigenetics and reprogramming in development and cancer. **Prof. Peter Friedl** (Cell Biology Dept., Radboud University, Nijmegen, The Netherlands) presented some interesting and innovative results from his group studying the plasticity of cancer invasion. His group has set up 3D collagen lattices and in vivo intravital multiphoton microscopy to image the migration process and invasion mechanism of tumour cells *in vivo*. Their results revealed deep collective invasion strands of hundreds of connected cells. By investigating the proliferation and movement of these connected cells, they found that the cells proliferate and move with the speed of up to 200μm per day. In addition, they showed that this collective invasion was impressively only trapped by single cell at the top and other cells were then recruited to join the invasion process. **Prof Frank Lyko** (DKFZ Heidelberg, Germany) gave a talk entitled "epigenetic cancer therapy". His group has studied the roles of two demethylation drugs, azacytidine and decitabine in clinical treatment. They use Illumina array-based analysis to determine the genome wide methylation profile. In their results, myeloid leukemia cells and blood and bone marrow samples from patients showed substantial differences in the demethylation responses after drug treatments. They found that these drugs can induce cell differentiation; however, the differentiation is not related to pharmacological inhibition of epigenetic target proteins. Now they are developing new biomarkers to predict patient responses to these drugs. They are also inventing new compounds as novel DNA methyltransferase inhibitors.

In the last day, the session was about the research of regeneration, cell competition and proliferative compensation using different animal models. The talks in this session were quite diverse; however, these talks broadened my horizons and taught me how diverse and interesting research could be! **Dr. Eduardo Moreno** (Spanish National Cancer Research Center Madrid, Spain) presented his work in cell competition in the early stage of cancer by using *Drosophila* as the model. Since cell competition is a "social control" to avoid conflicts among cells, any imbalance could be involved in or contribute to tumour formation. His group showed that about 75% of tumour cells double before morphology change. When they incubated wild type cells with myc-expressing cells, wild type cells would express more Myc to compete with myc-expressing cells. In addition, his group has tried to explore the genes which could be involved in cell competition; however, all the genes identified so far are not only related to cell competition but also other development processes. **Dr. Elly M Tanaka** (MPI Molecular Cell Biology and Genetics Dresden, Germany) talked about her research in reprogramming during axolotl limb regeneration. Her group has generated ubiquitously expressed GFP axolotls to study the tissue origin, plasticity and positional identity of limb blastema cells. By transplanting specific types of GFP-positive cells at certain positions of the body, they were able to trace and investigate how

these GFP cells grow, differentiate and proliferate and also which part of the body these cells give rise to. Their results showed that some progenitor cells retained some memory of tissue and embryonic origin and proximal/distal axis and therefore only gave rise to certain types of cells. Schwann cells, for example, can only contribute to Schwann cells and muscle cells determine muscle cells only. Meanwhile, some cells were more pluripotent and could acquire positional identity to give rise to more types of cells. Therefore, they concluded that the limb blastema is a heterogeneous pool of progenitor cells and limb reconstruction recruits tissue-specific cells and more pluripotent cells.

In addition to attending talk sessions, I also presented part of my PhD research as a poster entitled "Reduced methylation of the SnrpN gene in neural stem cells supports an alternative origin for cranial germ cell tumours". It was a very good practice and experience presenting the work I have been doing for three years. Because most of the attendees work in the related areas, I received some feedback and suggestions which would benefit my work and help the completion of my research.

The workshop was held in the Banz Monastery Education Centre. I was told that because the forest around the monastery was protected and maintained carefully, most endemic species of trees could only be found and seen there but not other place in Bavaria. Thus, the scene was very "critical Bavaria" and absolutely fabulous!

I would like to thank the BSCB for the Honor Fellow Travel Award that contributed part of the expenses for my attendance to this workshop.

Shih-Han Lee
Institute of Genetics, University of Nottingham

Society for Neuroscience: Annual Meeting 2008

15–19 November 2008; Washington D.C., USA.

> As we arrived on the day before the conference started, we had a brief exploration of the area around our hotel, which included a visit to the Jefferson memorial, the ellipse and the White House to mention a few. Having such attractions right next to our accommodation was a joy, which never got old even as we passed them on the bus every morning.

The Conference kicked off on a Saturday morning, with over 30,000 neuroscientists converging on the Walter E. Washington convention centre in downtown Washington D.C. With the conference providing presentations and posters on a huge variety of topics, our lab focused on our subject matter – developmental neuroscience and CNS repair. As such on the first day of the conference, we attended the symposium entitled "**Astrocytes, Reactive Gliosis, and Regeneration in the Central Nervous System**" chaired by **Milos Pekny** (Göteborg, Sweden). The stimulating session presented a novel view of astroglial cells and outlined the importance for the development of novel strategies for brain repair.

The discussion focused on astrocytes as a key component of the neurogenic niche in the adult brain, and addressed the function of astrocytes in brain and spinal cord repair. Interestingly, it was forwarded that recent data pointed to reactive astrocytes as a source of multipotent stem cells in brain injury, demonstrating a new take on the general view that gliosis is inconsistent with regeneration in the CNS.

This was closely followed by our first round of poster sessions in the presentation hall. This in itself was a huge attraction, consisting of more than 473,000 square feet packed with interesting posters and trade exhibitions. The session we attended was "**axon growth and guidance**", which comprised many posters pertinent to our work, mainly those concerning axon turning toward gradients of diffusible chemotropic molecules. In particular, there was an intriguing poster by **Masato Igarashi** (Niigata, Japan) which screened the proteome of a growth cone, then sequentially knocked down the most prevalent in order to determine which were important for growth cone and axon growth. This labour intensive approach was very informative and elucidated some novel potential mediators of axon growth.

Over the next few days, there was a hectic schedule of symposia, minisymposia, slideshows and poster sessions. One of the most interesting and insightful mornings came from the minisymposia "**Axon Regeneration in the CNS: New Models and Insights**" chaired by **Binhai Zheng** (University of California, San Diego). New methods of studying CNS regeneration were discussed, including using *C. elegans* as a model organism by **Andrew Chisholm** (University of California, San Diego), and a demonstration of new technology to study nerve injury by **Binhai Zheng**. This involved use of two-photon microscopy to observe individual axons *in vivo* after being injured by laser ablation, revealing interesting growth behaviour never seen before. The session was concluded by **Jerry Silver** (Case Western Reserve University, Cleveland, Ohio) renowned for his work on the glial scar and axon regeneration. The presentation covered findings from his recent publication which used an imaginative approach to overcome nerve paralysis. Through introduction of channelrhodopsin protein into nerve cells controlling the diaphragm, spontaneous rhythmical depolarisations could be induced. Interestingly, this induction involved exposure of these nerves to bright light, which caused a recovery of diaphragm function, providing a great example of original and pioneering research.

The following poster session also proved exciting and provided contact with an American lab who was interested in the same signalling protein, Epac, as our lab, presented by **Chris Whitaker** (University of Louisville, Kentucky). We were able to exchange information on antibodies and staining methods, as well as helpful discussions on protein function. The information gained was invaluable and was only possible due to SFN.

The featured lecture by **Christine Holt** (University of Cambridge, UK) was particularly enlightening and captivating, presenting research from different points over her distinguished career. This included how retinal ganglion cell axons in *Xenopus laevis* reach their targets in the tectum to establish the visual pathway, to the more recent, contentious issue of the role of local mRNA synthesis in axon guidance. As the lab supervisor was a former lab member in the Holt lab, we had the opportunity to have dinner with her after the lecture, dining at a restaurant on Pennsylvania Avenue a few blocks away from the White House.

On the last day, our lab was presenting two posters, one of which I was the lead author. The session began at a spritely 8am and ran until 12 noon, giving the droves of scientists plenty of time to scrutinize and discuss our posters. During the four hours we had a great mix of people from all over the world, from many different scientific backgrounds asking questions, providing interesting discussion topics all the time. We were also lucky enough to be joined in the poster session by Martin Berry and Ann Logan (University of Birmingham, UK), one of the few labs in the UK to do *in vivo* CNS regeneration experiments. One of their posters demonstrated that retinal axons show growth through and beyond the glial scar after intravitreal peripheral nerve transplants, providing intriguing data which suggests axons are capable of traversing and even dispersing the glial scar.

I would like to thank the BSCB for allocating the money that allowed me to attend this conference. The experience has greatly improved my CV and allowed me experience, learn and present at the largest neuroscience conference in the world. What I have learnt was invaluable to my progression as a PhD student.

Andrew Peace
University of Aberdeen, UK

> Arriving at the Washington Convention Centre was fairly daunting for first time Neuroscience goers, with over 31,000 scientists from diverse fields within neuroscience presenting more than 15,000 posters, and with many lectures and symposiums to attend we were in for a packed five days.

Myself (Rose), Chris, and Rachel all travelled from King's College London, where we are all PhD students in the Wolfson Centre for Age Related Diseases. Our lab focuses on the huge area of pain, injury and repair of the damaged nervous system, consequently our individual research interests are very different and therefore we each had very different experiences at Neuroscience 2008.

Rose Fricker

The first poster that caught my attention was on the first day and was presented by **Dimaio et al.**, from Drexel University Philadelphia. The group used YFP-H transgenic mice, mice we use in our lab, for *in vivo* imaging of sensory axons regenerating from the PNS to the CNS. Utilising the fluorescence of DRG neurons, the same axons were followed in the same animal after dorsal root crush injury for up to 24 days. A good initial regenerative response was seen but as expected no extension beyond the dorsal root entry zone (DREZ). It was really interesting to see the YFP-H transgenic line used in this *in vivo* model in the context of nerve regeneration.

A poster highly related to my own research presented by **Tao et al.**, from Med. Coll. Georgia, Augusta, was particularly interesting on the second day. The work focused on Erbin, a protein that interacts with ErbB2, a key Neuregulin 1 (NRG1) receptor. Erbin null mice showed abnormal myelination and Remak bundle formation leading to a change in conduction velocity and sensory thresholds. Biochemical experiments also indicated that Erbin had a role in ErbB2 stability on the axon membrane. This poster adds to the body of knowledge in the complex NRG1-ErbB signalling pathways showing the importance of accessory proteins.

I was lucky enough to attend a special lecture presented by **C.E. Holt** from the University of Cambridge. The lecture focused on the use of the *Xenopus* visual pathway as a model system for understanding the cellular and molecular mechanisms underlying axon navigation. Time-lapse recordings of *in vitro* growth cone assays showing responses to guidance cues and laser capture of growth cones for microarray analysis in order to study mRNA levels in individual growth cones, came together to show local mRNA translation in growth cones provide the necessary proteins for the adaptive a responsive behaviour growth cones show in relation to their environment.

My poster presentation was titled; 'Conditional gene deletion of Neuregulin-1 in DRG cells reveals its critical role in axoglial signalling and sensory function', showing in particular the role of NRG1 signalling in Remak bundle structure. I presented my poster on the penultimate day of the conference and it went very well with lots of interest and great feedback from people within the field. I found the experience really useful and confidence building for future presentations. Overall the conference was an amazing opportunity for me and I learnt a considerable amount.

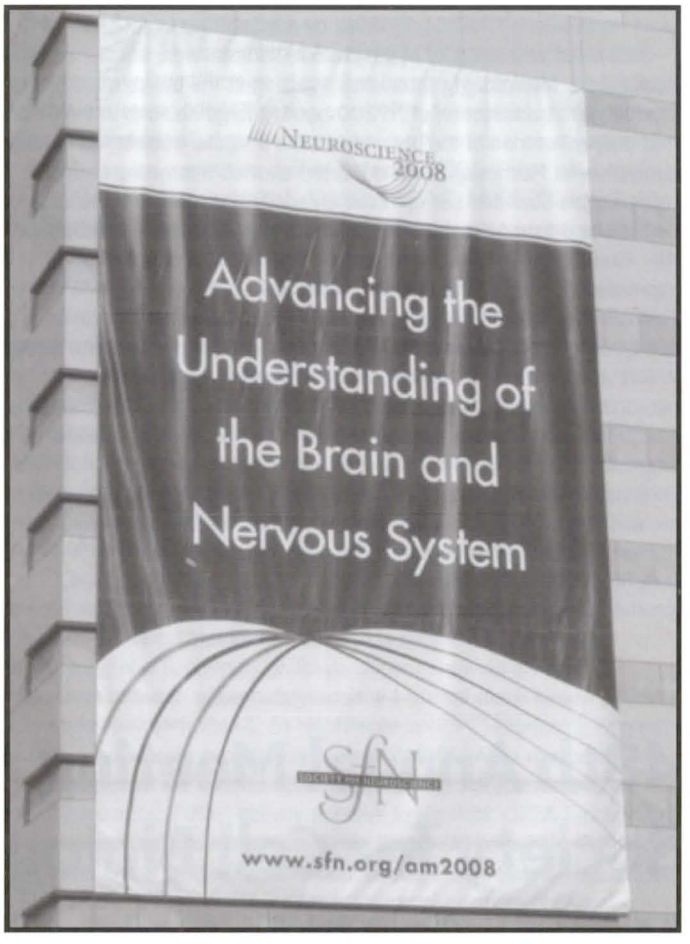
Rachel Wodarski

My research is focused on the role of glial cells in neuropathic pain, with a special interest in microglial-neuronal communication via the neuronal chemokine fractalkine (CX_3CL1) and its microglial receptor CX_3CR1. It was encouraging to see that there were several poster sessions each day dedicated to pain and neuropathic pain, providing me with the opportunity to talk to other scientists in my field and get new input and ideas on how to improve my own research. Furthermore, I had the possibility to make contacts within other labs that will be helpful for my future career. Although the poster I presented was about spinal glial activation in chemotherapy-induced neuropathy, my research also involves microglial cell culture as well as studies in the CX_3CR1 knockout mouse and the following posters were of particular interest.

On Saturday afternoon, **S. Beggs** (University of Toronto) showed data about changes in the blood spinal cord barrier (BSCB) permeability after peripheral nerve injury. He showed that the BSCB permeability peaks 24 hrs after injury, reverses to basal levels 7 days after injury and that this increased permeability correlates with the activation of both microglia and astrocytes. He also showed a decrease in aquaporin 4 after injury and hypothesized that this causes a swelling of astrocytes and so an interruption of the BSCB. On Sunday, **E. Winter** (Pfizer) presented data showing that in two models of neuropathic pain the peripheral benzodiazepine receptor (PBR) is up-regulated after injury. This was determined by the binding of a radioactive ligand ($[H^3]$PK11195) as an indirect marker. This increased binding of PK11195 correlated with microglial activation. He showed that the expression of the PBR might be an interesting marker for microglial activation. On Monday, **H. Beal McIlvain** (Wyeth) presented data using an automated image processing system in microglia in culture stained with Cd11b (OX42) to show activation of microglial cells after LPS or ATP stimulus. Using a variety of agonists and antagonists for different ATP receptors, he showed that P2Y receptors are involved in microglial activation after stimulation with ATP. For me his method of assessing microglial activation was very interesting and maybe I can apply it to my own research.

On Monday afternoon I presented my poster on the reduction of chemotherapy-induced hypersensitivity via inhibition of a protease (cathepsin S) that we think is crucial for microglial-neuronal communication via the CX_3CL1/CX_3CR1 pair. Presenting my data to such a broad audience and thereby having many discussions and questions was challenging but helped me to prepare for the task of writing my thesis and discussing my research in my viva.

On the last day I had the chance to attend the minisymposium: "**Chemokines in the Nervous System**" chaired by **W. Rostene** (Saint-Antoine Hospital). The first talk was given by **K. Biber** (University Groningen) who showed very interesting data on CCL21 which is expressed in the injured brain in neuronal vesicles. He suggested



CCL21 as a communicator with microglial cells via the CXCR3 receptor. This was followed up by **J. Zhang** (McGill University) who talked about CCL2/CCR2 signalling in chronic pain, giving a nice summary of the latest publications of her group. **E. Apartis** (Saint-Antoine Hospital) and **G. Banisadr** (Northwestern University) discussed chemokines in cocaine sensitization and multiple sclerosis, respectively. The two last talks were dedicated to chemokines and pain. **F.A. White** (Loyola University Chicago) talked about opioid induced pain and the involvement of CXCR4. The last talk by **E.D. Milligan** (University of New Mexico) was about the role of fractalkine and microglial activation in neuropathic pain and she presented a summary of her latest work.

All in all Neuroscience 2008 in Washington D.C. was an interesting and encouraging experience and very useful for my development as a scientist.

Christoforos Tsantoulas

My research employs genetic manipulation methods as a way of altering gene expression levels to allow identification of genes that may have a role in neuropathic pain states. Arguably the most promising technique has been the use of viral vectors for delivery of recombinant constructs into the nervous system *in vivo*. One of the first sessions I attended was a poster by **F. Heitz** (University of Zurich), in which he presented a new system that combines transfection with lentiviruses containing loxP-flanked shRNAs and Cre-expressing transgenic mice to produce heritable, inducible, neuron- or astrocyte- specific knock-down in the adult brain. Such a method could be applied to study genes that are essential for the survival of the organism, or in cases where one wants to study genes underlying a phenotype in a more controllable, subtle manner by using shRNA constructs that produce varying degrees of knock-down.

On Tuesday, **M. Pertin** (University Hospital Center CHUV) presented data on AAV-6 efficacy and specificity of transfection, using a variety of delivery routes. Using immunohistological methods to detect the virus-encoded GFP signal in the L4 DRG and spinal cord, they demonstrated that the highest transfection efficiency was achieved when injecting the

virus intrathecally (~60%), followed by sciatic nerve injection (~30%); the vast majority of the positive neurons were small nociceptors. Interestingly, intravenus injection in the tail vain led to predominant transduction of NF200-positive large neurons in the DRG and deeper laminae of the dorsal horn. On a similar subject, **R. Lowery** (University of Rochester Medical Center) showed interesting data on using double-stranded self-complementary AAV vectors to transduce neurons and astrocytes *in vivo*. Looking at one week after injection in the visual cortex they were able to demonstrate that dsAAV are expressed significantly faster than traditional single stranded AAV. Furthermore, they characterised this expression showing that different serotypes of the virus exhibited distinct tropisms for different cell types.

A relatively new concept on manipulating gene expression in neuropathic pain was highlighted by **S. Zhang** (Sangamo Biosciences). The group used Herpes simplex viruses to deliver Zinc finger proteins engineered to specifically obstruct expression of Nav1.8 and TrkA in rat DRG neurons. Following subcutaneous injection in the hind paw one or six weeks after injury in a spinal nerve ligation model, they were able to see significant improvement in mechanical pain withdrawal thresholds that lasted for many weeks. Importantly, in December Sangamo signed a partnership with Sigma to make these tools commercially available to researchers.

On Sunday I presented my research in which we characterised the expression of the Kv9.1 potassium channel subunit in naïve rat dorsal root ganglia by combining *in-situ* hybridization and immunohistochemistry methods. We also demonstrated the dramatic down-regulation of this channel in a model of peripheral nerve injury and proposed that this loss of function may be linked to emergence of ectopic activity and development of neuropathic pain. During my presentation, I was able to meet a number of well-respected researchers and discuss my work and future goals with them, also opening the way for a number of collaborations. Additionally, I encountered individuals that work on related targets in different contexts, with whom I shared information and insight. Overall, my SfN presentation was a very helpful and worthwhile experience that gave me more confidence in my research and benefited me from a practical point of view as well.

Christoforos Tsantoulas, Rachel Wodarski, Rose Fricker
King's College London

48th Annual Meeting of the American Society for Cell Biology

13–17 December 2008. San Francisco, USA

Thousands of scientists from all over the world meet every year at the ASCB to enjoy the opportunity to learn about the latest cutting-edge research in cell biology, hear the most prominent investigators in their fields, and above all present their own research to a broad peer audience.

This year several events attracted a wide audience, starting with the opening Keynote Lecture on Saturday 13th by **Francis Collins**, former Director of the NIH National Human Genome Research Institute on "Cell Biology in the Genomic Era". Collins highlighted a variety of ambitious NIH projects aimed at providing novel insights to genome function, such as The Cancer Genome Atlas, the knock out of every single mouse gene, and the ENCODE project bringing together the effort of many laboratories to provide immediately, on the internet, information on functional components across the entire human genome (transcript maps, transcription binding sites, promoter sites, etc).

On Sunday 14th, the E.E. Just Lecture delivered by **James Earl King Hildreth** (Meharry Medical College, School of Medicine, Nashville) presented interesting work on how HIV infection can coordinate cholesterol biosynthesis, trafficking and transcription through activation of sterol-responsive element binding protein 2 (SREBP-2) and SREBP-responsive genes like the transcription factor TFII-I or the SREBP-target gene NPC-1, which appear crucial for HIV replication and release from infected cells.

Presentation of the E.B Wilson Medal, the most prestigious ASCB award, to Nobel Prize Winners **Martin Chalfie** (Columbia University, New York) and **Roger Tsien** (University of California, San Diego) took place on the evening of Tuesday 16th. While Chalfie gave an overview on how *Aequorea victoria* green fluorescent protein (GFP) influenced his research on *C. elegans*, Tsien, who has "refined" GFP over the years expanding its colour palette, introduced new fusion proteins that can emit either infrared fluorescence (thus facilitating fluorescent imaging in intact animals and providing new possibilities for multicolour imaging) or singlet oxygen, enabling electron microscopic imaging. A visual testimony of the broad use of GFP and its multicoloured descendents had been provided just a few hours before by the entertaining "Celldance" session, which showcased a fascinating mini-film festival of live cell imaging with the best features chosen from hundreds of entries.

The morning plenary sessions covered several aspects of cell biology ranging from biology of the senses to nuclear organization and gene regulation. On Monday 15th, **Didier Stainier** (University of California, San Francisco) gave a fascinating talk on liver regeneration in zebrafish. Using a chemical/genetic approach together with single cell lineage tracing, he illustrated how progenitors located in the hepatopancreatic duct may regulate liver development and regeneration

through Wnt2bb and Bmp2b signalling. He also revealed an unexpected inhibitory role for Fgf10 in liver regeneration after hepatocyte ablation. A few minutes later **John Condeelis** (Albert Einstein College of Medicine, Bronx, NY) discussed how expression profiling and multi-photon-based intravital imaging can be combined to produce so-called "invasion signatures" and identify key genes involved in survival, chemotherapy-resistance and metastatic behaviour of breast tumour cells. These include molecules related to actin dynamics, such as cofilin, the N-WASP/Arp2/3 complex, and Mena. In addition, such "invasion signatures" may provide biomarkers for predicting prognosis, which can be successfully applied in clinical studies (such as anti-Mena antibodies, for example). By combining in vivo cell biology with stunning high-resolution imaging and examples of clinical applications Condeelis' talk undoubtedly represented one of the meeting highlights.

The meeting kicked off with special interest subgroups on the afternoon of Saturday 13th. In the "**Monomeric GTPases regulating intracellular trafficking**" subgroup, **Rytis Prekeris** (University of Colorado Health Science Center) discussed his latest findings on the Rab11-interacting protein Rip11/FIP5, enriched at apical recycling endosomes in polarized epithelial cells and required for formation of epithelial cysts, three dimensional polarized structures. Rip11/FIP5 has a key role in routing internalized receptors through perinuclear recycling endosomes by interacting with kinesin II. In addition, Rip11/FIP5 binds sortin nexin 18 (SNX18), a PX-BAR-containing protein able to interact with AP-1, WASP, and affect lipid curvature enriched in apical endosomes in polarized epithelial cells. Rip11/FIP5 induces SNX18-dependent tubulation, adding another level of complexity to its function in endosomes.

David Bryant from the **Mostov** lab (University of California, San Francisco) described how the exocyst complex, a multiprotein complex involved in membrane delivery and secretion, acts as an effector for both Rab8 and Rab11a GTPases in promoting single lumen formation in epithelial cysts. Expression of dominant negative exocyst fragments, as well as disruption of Rab8 and Rab11a activity result in deficits in traffic directionality, ultimately affecting polarization. The emerging importance of the exocyst complex in cell polarity was clearly emphasized by talks and posters from **Wei Guo** (University of Pennsylvania) describing the exocyst function in invadopodia and cilia formation. The GTP-bound form of Rab11 directly interacts with Rabin8 (a Rab8 guanine nucleotide exchange factor), which binds the exocyst component Sec15, thus revealing a cascade of Rab GTPase activation in the control of membrane traffic from recycling endosomes to the plasma membrane. The multifunctional exocyst complex appears to have a crucial role also in neuronal polarity through a novel interaction with the polarity protein PAR-3, as I showed in my poster. It was very fruitful for me to discuss this result with Wei Guo and **Josh Lipschutz** (University of Pennsylvania), who reported a similar finding in ciliogenesis.

One of the many afternoon minisymposia was dedicated to the impact of protein modifications on cell biology. **Christine Schaner Tooley** from the **Macara** group (University of Virginia, Charlottesville) announced the identification of the first human N-terminal methyltransferase, NR-MT, acting on a X/P/K N-terminal consensus sequence and initially found responsible for N-terminal methylation of the Ran guanine nucleotide exchange factor, RCC1. Other potential targets for NR-MT include Rb1, Vrk2B, PARP-3, MLC1. N-methylation could affect binding ability to protein or DNA, or even protein stability, thus influencing a broad range of cellular processes including transcription, cell cycle control, protein synthesis, and cell motility.

On Wednesday 17th, in the "**Cellular Basis of Morphogenesis**" session, **Stephanie Gupton** from the **Gertler** lab (Massachusetts Institute of Technology, Cambridge, MA) presented very interesting data on a novel alternative pathway for neurite initiation that does not require the Ena/VASP family of actin regulatory proteins nor VAMP2-mediated exocytosis as previously shown, but is instead triggered by laminin and dependent on $\alpha 3\beta 1$ and $\alpha 7\beta 1$ integrin, focal adhesion kinase, Src activity, the Arp2/3 complex and exocytosis mediated by the Tetanus Neurotoxin-insensitive VAMP7.

In a big meeting such as this one, the possibility to interact with a diverse range of scientists at posters needs to be fully exploited. Among the posters I saw, I would like to mention recent work from the **Hirokawa** group (University of Tokyo, Japan) showing a novel interaction between phosphatidylinositol 4-phosphate 5-kinase (PIP5K) β, a phosphatidylinositol(4, 5)-bisphosphate (PIP2)-producing enzyme isoform, and kinesin superfamily protein 2A (KIF2A), a microtubule depolymerase of the kinesin-13 family, expressed predominantly in growing neurites. PIP5K activity appears to regulate KIF2A function to ensure proper neurite elongation. **Craig Eyster** (NHLBI, NIH, Bethesda) illustrated a new clathrin-independent endocytosis pathway regulated by the small GTPase Arf6 for internalization of a variety of cargo proteins (CD44, CD98, ICAM1, H-Ras) and direct recycling back to the plasma membrane bypassing the classical transferrin-containing compartments. **Vidya Nadar** (Drexel University College of Medicine, Philadelphia) showed how polarized localization of phosphorylated kinesin-5 when axons encounter a turning cue allows microtubules to selectively invade the growth cone peripheral domain in the direction of the turn, opposing their entry into the other side.

Although the size of the ASCB meeting can be overwhelming, this is a conference that always allows researchers to get in touch with a broad array of emerging cell biology topics and directly interact with a wide range of scientists from all over the world. I am very grateful to the BSCB for providing me with the Honor Fell Travel Award and allowing me to enjoy such a great experience. After the busy days at the Moscone Conference Centre, there was time to sample some of the excellent restaurants San Francisco can offer...and hop on a cable car for a trip to the bay and a refreshing walk in Golden Gate Park.

Giovanna Lalli
Wolfson Centre for Age-Related Diseases, King's College London.

The Annual Meeting of the American Society for Cell Biology (ASCB) is one of the biggest meetings in the field of cell biology, and our first experience of an international meeting. The 48th Annual Meeting and was held at the Moscone Centre, San Francisco; with in excess of 9,000 attendees spread over five days of presentations.

We arrived a few days before the conference started allowing us plenty of time to explore the city. We cycled around the city and across the Golden Gate Bridge to the Marin Headlands taking in the most beautiful views of the Bay area. We visited Alcatraz Island and with help from the audio tour became momentarily absorbed in stories of jail breaks and riots. We also visited the impressive, newly

opened Academy of Sciences; an aquarium, rainforest and planetarium in one. There was also plenty of sunny hours spent walking around the parkland, strolling through the Italian quarters, and observing the hustle and bustle of China Town and Union Square.

On Saturday the 13th of December the meeting started with our invitation to attend the IAC Roundtable Lunch for PhD students. This informal lunch allowed time for PhD students to network with other students from different years and different continents, and to share their experiences of PhD life so far. This was a great start to the meeting as we got to know many other students at the beginning who we would bump into along the course of the five days of talks. The lunch was also an opportunity for students to give feedback to ASCB members, exchanging ideas on how to improve the conference organisation and receiving some career advice from established researchers. After the lunch everyone made their way to the Moscone centre and split into various special interest groups. We choose the group "**At the Limits: Optical Methods for Single Molecules, Cells, and Organisms**" in which different talks were given with the focus on new light microscopy techniques and their value to cell biology. Seven short talks were given in this session and the speakers presented applications for techniques like PALM, single molecule FRET, and Array Tomography.

The day finished with the Keynote Symposium "**Cell biology in the Genomic Era**" given by **Francis Collins**, Former Director of the National Human Genome Research Institute (see above for further description).

After the Keynote Symposium the opening night reception took place, where food and drinks were offered in the exhibition hall. This was a great opportunity to meet fellow researchers in an informal environment and also to talk to the exhibitors.

From Sunday on, the days were split into morning and afternoon sessions. In the longer symposia in the morning three talks were given on specific subjects. These sessions provided a really good overview of research in the cell biology field and addressed a broad range of researchers with a different cell biology background. An interesting talk for example was given in the symposium "**Cytoskeletal Dynamics**" on Tuesday by **C. Walczak**, Indiana University, USA. In her talk "Regulation of Microtubule Dynamics and Organization during Spindle Assembly", she presented her work on microtubules especially K-fibers during mitosis and their role in chromosome congression and alignment. She found that the main function of K-fibers seems to be the maintenance of chromosome alignment, which challenges the widely accepted model that K-fibers contribute to chromosome congression.

In the afternoons various Minisymposia were held. These consisted of five talks given by researchers from all over the world. They also provided an excellent opportunity for young Postdocs to present their work at an international meeting.

Interesting Minisymposia included "Membrane Heterogeneity and Trafficking" as well as "Mitosis and Meiosis".

Every day at noon until the early afternoon the poster presentations took place. With over 3500 poster being presented throughout the meeting, these poster sessions played an important role in focussing our interests on an array of different projects. For us these sessions provided the possibility to learn more about research in other laboratories and to discuss findings and ideas one on one with the researchers. We presented our poster on Wednesday which not only gave us vital experience in presenting our work at international meetings but also allowed us to get a lot of feedback on our results. We were also lucky to have met some very influential people in our field. With so many posters being presented it was important to plan the sessions well in order to see all the relevant posters but we also allowed some time in order to broaden our perspective and to learn something completely new.

A highlight of the meeting for us was the E.B. Wilson Medal presentation and address on Tuesday the 16th December. **Martin Chalfie** (Columbia University, USA) and **Roger Tsien** (University of California, San Diego, USA) were awarded with the E.B. Wilson Medal from the ASCB only days after receiving the Nobel Prize for their work on the discovery of green fluorescent protein. Martin Chalfie gave an insightful and very entertaining talk looking back on the succession of events in his career that led to the publication of "Green fluorescent protein as a marker for gene expression", the first publication of GFP in *Science* back in 1992. Chalfie also focussed on the work of his lab in using *C. elegans* to investigate aspects of nerve cell development and function. Roger Tsien followed with a very focused and in-depth presentation on the potential for further exploitation of fluorescent protein variants. Tsien focussed on how changing the chemistry of fluorescent molecules alters their emission wavelength in order to obtain a greater penetration of emitted light. Through the specific labelling of mouse tumour cells Tsien showed that after tumour removal we now have a valuable tool allowing surgeons to inspect the remaining tissue, at depth, to ensure full removal of tumour cells. Not a sound was heard from the audience as we all sat there in awe.

The meeting also offered some light relief from the research, such as "Celldance: The magic role of Cell Biology" in which one winner reconstructed mitosis to the tune of Tchaikovsky's The Nutcracker with around 15 friends in a swimming pool using foam tubes and blow up balls. We especially enjoyed the stand up comedy session "CellSlam: SF shoutout" at which scientists presented their comedy to a large audience in the form of dance, rapping, a comedy sketch based around prostate cancer, and an extremely funny love song entitled "My little G protein".

In summary, attending the meeting was a fantastic opportunity for us. It offered us the full conference experience expected from such a well-established meeting. We would strongly recommend that future PhD students attend this conference and hope that they take away as much from this experience as we have. We thank the BSCB for the Honor Fell Travel Awards which allowed us to attend this meeting.

Annika Budnik and Helen Hughes
Department of Biochemistry, University of Bristol

The Many Faces of Ubiquitin Keystone Symposia

January 11th-16th 2009, Copper Mountain, Colorado

Snow storms, delayed flights and an altitude of 3km above sea level were not enough to discourage over 200 scientists congregating at Copper Mountain, Colorado for the "Many Faces of Ubiquitin" Keystone Symposia. For many, it was an opportunity to exchange ideas on the non-conventional functions for ubiquitin and ubiquitin-like proteins in signal transduction, and for me, being relatively new to the field, it was a fantastic opportunity to discover just how many functions there are, and meet some of the big names that have been responsible for discovering them.

Each day started early, with morning sessions taking place between 8-11am, allowing those so inclined to hit the slopes in the afternoon. For those staying out of the cold, workshops on "Tools and Reagents Development" and "Animal Models" were available. The plenary talks then recommenced at 5-7pm, the day culminating with "light bites" and posters.

While a broad spectrum of research was covered, it soon became apparent what the hot topics are at the moment, and what would be occupying the minds of scientists in the field in the coming year.

The anaphase promoting complex (APC), a multi-subunit complex that functions in cell-cycle progression was discussed by **David Morgan** (University of California). He presented detailed evidence that not only the activator subunit of the APC, but also the core subunit can bind substrates. He suggested that the substrate might bridge the activator and core subunits, and that this enhances activator binding. **Michael Rape** (UC Berkley) also focussed on the APC during his presentation on assembly of K11-linked chains in mitosis. His lab have used various lysine-linked poly-ubiquitin chains to demonstrate that K11-linked chains mediate APC function, and have identified UbcH10 as the E3 ligase responsible for K11 chain assembly. He highlighted the identification of a novel APC subunit, Ube2S, which promotes K11-linked chain assembly and cell cycle progression and proposed that this new subunit may act as a potential bridge between the APC and the spindle.

The multiple roles of ubiquitination in NF-κB signalling were discussed by a number of speakers. **Claudio Joazeiro** (The Scripps Research Institute, USA) talked about MULAN, a mitochondrial E3 ubiquitin ligase involved in mitochondrial dynamics and NF-κB signalling. MULAN was identified in an siRNA screen for E3 ligases that function in mitochondrial clustering. Joazeiro has been able to demonstrate that MULAN requires its RING finger domain and correct subcellular localisation to regulate mitochondrial dynamics. However, previous work has shown that loss of the RING finger domain potentiates MULAN-mediated NF-κB activation, suggesting

MULAN elicits independent pathways in the regulation of these two different functions.

Kazuhiro Iwai (Osaka, Japan) focussed on a different facet of NF-κB signalling, discussing the linear ubiquitin chain assembly complex (LUBAC), a ubiquitin ligase composed of HOIL-1L and HOIP RING-finger proteins that conjugate a novel type of polyubiquitin chain in which ubiquitin moieties are linked via head-to-tail linkage. His presented data indicates that LUBAC regulates TNFα mediated NF-κB signalling by ubiquitinating NEMO, a subunit of Inhibitor of κB Kinase (IKK).

Ivan Dikic (Frankfurt University) also discussed the function of linear ubiquitin chains in NF-κB signalling. He outlined work in which the crystal structure of NEMO in complex with a linear di-ubiquitin chain has been solved. It is apparent that binding of the di-ubiquitin results in an unwinding of NEMO that is transmitted to the rest of the protein. He showed evidence that this interaction is necessary for NEMO's anti-apoptotic activity. He also discussed the medical implications of this interaction, having found that mutations in NEMO that impair di-ubiquitin binding are present in some cases of ectodermal dysplasia.

Ingrid Wertz (Genentech) explained how NF-κB signalling is modulated by the protein A20, which functions as both an E3 ubiquitin ligase and a deubiquitinating enzyme for RIP, a protein kinase recruited to the TNF receptor. Antibodies specific to different ubiquitin chain linkages showed A20-mediated removal of K63-linked chains, and the re-attachment of K-48 linked chains, thereby targeting RIP for degradation. While their recent work has focussed on RIP, they have also observed this ubiquitin chain editing on IRAK in IL1 signalling, suggesting that chain editing might occur in multiple cellular contexts.

Ray Deshaies (Caltech) spoke about the activation of the SCF ubiquitin ligase by Nedd8 conjugation. He described the combination of biochemical assays and crystallography that his lab have used to demonstrate how Nedd8 modification closes the gap between E2 and substrate, resulting in an increase in efficiency and processivity of the SCF ligase.

Throughout the conference a number of speakers gave talks which highlighted the power and versatility of quantitative mass spectrometry techniques, such as Stable Isotope Labelling with Amino acids in Cell culture (SILAC). **Junmin Peng** (Emory University, USA) described its use in determining frequency of different ubiquitin chain linkages, and found that only K63-linked chain frequency was unaltered following proteasome inhibition, implying a role for all other chain linkages in proteasomal degradation. He also observed that the introduction of different ubiquitin lysine mutants resulted in an increase in the frequency of other chains, suggesting redundancy. Finally he utilised SILAC in combination with a K11R ubiquitin mutant to identify 91 proteins that appear to be ubiquitinated by K11-linked chains.

Ron Hay (University of Dundee) has also used SILAC to good effect, addressing the role of the ubiquitin-like protein SUMO in the heat shock response. By comparing control, heat-shocked and recovering samples, he was able to clearly show a redistribution of SUMOylated proteins following heat shock.

A conference on ubiquitin would not have been complete without talks addressing the function of the proteasome, and two examples which did exactly that were given by **Kylie Walters** (Minnesota, USA) and **Heran Darwin** (New York University). Kylie Walters outlined her work on the proteasome's ubiquitin receptors: S5a and Rpn13, discussing the function of the two ubiquitin interacting motifs (UIMs) of S5a. She utilised NMR to show that Rpn13 binds the proximal ubiquitin of K48 di-ubiquitin chains, while S5a binds the distal. Heran Darwin discussed her discovery of a prokaryotic ubiquitin-like protein, Pup, which is involved in the proteasomal degradation pathway of *Mycobacterium tuberculosis*. Pup is different from ubiquitin in that it undergoes de-amidation prior to PafA-mediated conjugation to substrates. These Pupylated substrates are then able to interact with the proteasome cap protein Mpa, and are ultimately degraded.

In a number of talks, there was emphasis on the translational aspects of the research. Work outlined by **Vishva Dixit** (Genentech) focussed on the possibility that tumours may overexpress de-ubiquitinating enzymes as a general survival strategy, highlighting the role of USP9x in the stabilisation of the anti-apoptotic protein Mcl-1. High levels of Mcl-1 have been shown to be an indicator of poor prognosis in a number of tumours, and the group have found a correlation between high Mcl-1 levels and overexpression of USP9x. He demonstrated that tumours could be re-sensitised to Bcl-2 inhibitors by combining them with inhibition or knockdown of USP9x.

Edward Yeh (University of Texas) discussed SUMOylation in the hypoxic response, specifically Sentrin/SUMO specific protease 1 (SENP1) and its function during hypoxia and cancer pathogenesis. His results indicate that SENP1 de-SUMOylates HIF1α, preventing its degradation. During normoxia, prolines on HIF1α are hydroxylated, facilitating its interaction with pVHL and targeting for degradation. However in hypoxic conditions HIF1α is no longer hydroxylated and instead dimerises with HIF1β and translocates to the nucleus. Yeh proposes a second level of regulation in which HIF1α is SUMOylated in the nucleus, which targets it for proline-independent pVHL mediated degradation. However, deSUMOylation by SENP1 prevents degradation, allowing HIF1α-mediated activation of the hypoxic response.

Marcus Groettrup (University of Constance, Germany) discussed a link between the ubiquitin like protein FAT10 and aggresomes. Aggresomes are bodies of aggregated, multi-ubiquitinated, misfolded proteins that arise when the cells capacity to degrade these defective proteins is exceeded, and are frequently observed in a number of neurodegenerative diseases and cancers. FAT10 expression is induced by IFNγ and targets proteins for proteasomal degradation in a ubiquitin independent manner. Groettrup described the interaction of FAT10 with Histone DeAcetylase 6 (HDAC6), resulting in its targeting to aggresomes, and suggested that a failure of FAT10 to target proteins for proteasomal degradation may lead to alternative HDAC6-associated removal to aggresomes.

To mention all the high quality talks that were given would take more space than I am allotted, and this is before I even start on the numerous exemplary posters that I saw. Needless to say the whole event was of incredible value, and has opened my eyes to the vast array of research happening within my field. The conference was very well organised, and managed to combine truly excellent science with some truly excellent snow. I'd like to thank the BSCB for a generous Honor Fell Travel Award which enabled me to attend this conference.

Chris Thorne
University of Liverpool

BSCB Summer studentships

2008 saw the very first cohort of undergraduate students enter labs to undertake summer studentships of around 8 weeks funded by the BSCB. The students came from diverse backgrounds including basic science and medical degree students and including one (Gabriella Cagnoni) visiting Edinburgh from Turin. These studentships provide valuable experience for these students and the scheme will continue in the coming years. Details of the 2009 round can be found on the BSCB website including full details of the application procedure. The deadline for applications is 19th May 2009. The reports that follow were written by the students' themselves and illustrate the diversity of work going on in 21st century cell biology as well as providing a clear illustration of the value of these awards to these students. Clare Wishart even goes as far as to suggest that these should be mandatory for all students before going in to a lab as part of their degree programme!

FRET analysis of cAMP-regulated cell signaling molecules in growth cones of DRG neurons in tissue culture models of CNS regeneration

Lindsey Coleman is in her final (Honours) year studying for a BSc degree in Biomedical Sciences (with Pharmacology) at the School of Medical Sciences, University of Aberdeen, and undertook a summer project in 2008 in the laboratory of Dr Derryck Shewan, Institute of Medical Sciences, University of Aberdeen.

The adult mammalian central nervous system (CNS) is inhibitory to axon regeneration and as a result injury to the spinal cord is usually irreparable. It is believed that molecular changes occur in the postnatal spinal cord preventing damaged axons from regrowing. One region where this is particularly evident is at the boundary where the peripheral nervous system (PNS) meets the CNS, a region known as the dorsal root entry zone (DREZ), where sensory axon regeneration into the spinal cord becomes blocked during a very narrow time window 3 or 4 days after birth. The study of this region is important as it is the site of dorsal root avulsion injuries, which can occur after sudden wrenching of the limb, for example during motor cycle accidents. As a result, peripheral sensation is lost because dorsal root ganglion (DRG) axons are incapable of regenerating back into the spinal cord. The DREZ region has been studied in the past using a cryoculture model, and the aim of my BSCB-funded summer project was to investigate whether it may be possible to image live regenerating DRG neurites as they encounter the DREZ in thin sections of adult rat spinal cord.

Although the experimental outline seemed straightforward, I quickly realised that the methodology is very tricky and intricate, particularly with only a few weeks to work on the project. I firstly had to establish that the longitudinal spinal cord tissue sections cut using a cryostat and picked up on polylysine-coated 13mm sterile round glass coverslips contained regions of DREZ, characterised by finger-like overlapping projections of CNS and PNS glial cells (astrocytes and Schwann cells). This is very difficult for the untrained eye to spot using a phase contrast microscope, so we pre-stained sections using antibodies to GFAP (an astrocyte marker) or laminin (highly expressed by Schwann cells and extracellular matrix). Having selected suitable sections the next challenge was to plate dissociated neonatal rat DRG neurons at an appropriate density in order that a few neurons might attach within the vicinity of the DREZ, in the hope that they would then regenerate neurites that grew towards the spinal cord along the dorsal root.

Neurite outgrowth cannot be tracked on the tissue sections using phase contrast microscopy, and therefore it was necessary to transfect neonatal DRG neurons with green fluorescent protein (GFP) using an Amaxa Nucleofector device in order to follow live neurite growth on the tissue sections by fluorescence time-lapse microscopy. The main aim was to see if DRG neurite outgrowth could be successfully followed over a period of time, and also to attempt to record growth cone behaviour on reaching the DREZ. In addition, because application of cAMP agonists to neurons *in vitro* and *in vivo* has been reported to enhance axon regeneration, I attempted to follow live neurite regeneration on spinal cord sections after bath application of the cAMP agonist Sp-cAMPS.

Above: A GFP-expressing neonatal DRG neuron sending a long process onto a section of adult rat spinal cord after activation of cAMP using the agonist Sp-cAMPS.

In parallel with the cryoculture experiments, I also looked at growth cone interactions in vitro with astrocytes, the CNS glial cells present at the DREZ PNS/CNS interface. Ultimately the lab would like to analyse protein activities in DRG growth cones encountering the DREZ, and having recently established the fluorescence resonance energy transfer (FRET) method in primary neurons we wanted to investigate the feasibility of measuring FRET on growth cone contact with cells/tissues in the neuronal environment. The lab has recently shown that activation of cAMP-Epac signalling enhances neurite regeneration on adult spinal cord

tissue, so I transfected neonatal DRG neurons with a FRET construct for Epac (a kind gift from Kees Jalink, the Netherlands Cancer Institute, Amsterdam, NL) to attempt to detect changes in its activity when growth cones made contact with the astrocytes.

There was not enough time in the project to make quantitative measurements in the various experiments I carried out, but I made several observations that will benefit future work in the lab. I found that neurites could grow just as well on pre-antibody labelled dorsal root tissue and that GFP-positive neurites could be followed by fluorescence time-lapse microscopy using our Leica AF6000LX imaging system, without significant fluxes in focus. I also found the Sp-cAMPS treated neurons were more likely to send processes onto spinal cord tissue. Viable cultures were made in which FRET activity could be detected, and in the time since my project other members of the lab have been able to detect changes in FRET activity when growth cones contact astrocytes. This provides great optimism that future FRET studies will provide valuable information on protein activities in growth cones as they encounter CNS cells and tissues in vitro. The project has really opened my eyes to the intricacies of modern cell biological techniques in expanding understanding of cell function and signalling mechanisms, and has inspired me to aim for a research career. I thank the BSCB for its support.

Does Nanog regulate ES cell self-renewal by genetic repression or activation?

Gabriella Cagnoni, Molecular Biotechnology student, University of Turin, Italy working in the lab of Ian Chambers at the MRC Centre for Regenerative Medicine, Institute for Stem Cell Research, University of Edinburgh.

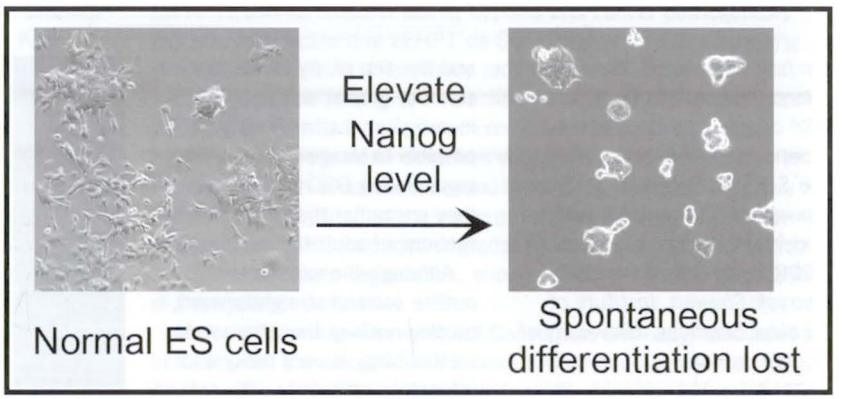
Embryonic stem (ES) cells are defined by the dual properties of symmetrical cell division (self-renewal) and the capacity to produce cellular derivatives of all three primary germ layers [1]. Self-renewal of ES cells is controlled by the transcription factors Oct3/4, Sox2 and Nanog. Of these, Nanog is able to direct self-renewal in cells in which it is overexpressed without requiring LIF/BMP stimulation [2]. Although the sites at which Oct3/4, Sox2 and Nanog bind in the ES cell genome have been mapped and shown to at least partially overlap [3], basic questions about the mechanisms of action of Oct3/4, Sox2 and Nanog remain unanswered. Dr. Ian Chambers lab have recently demonstrated that Nanog functions to shield the cell from commitment cues and that ES cells in which Nanog has been completely eliminated by complementary genetic deletion strategies continue to self-renew, albeit with dramatically reduced efficiency [4]. These recent studies have provided a range of cellular reagents with which we can probe the underlying mechanisms of Nanog action. Description of the work project

During my summer studentship I had the opportunity to contribute to the study of the role of Nanog in ES cell biology.

First, I used cloning techniques to create novel variants of Nanog and I cloned these into a mammalian expression vector. During this first part, I improved my technical experience in molecular biology, and in particular I learnt how to perform a complete cloning procedure, and how to cope with technical problems.

I next expressed these constructs in ES cells and I verified their correct expression. Then, I used these cells in some preliminary functional assays. At the same time, I tested the transcriptional activity of these fusion proteins by luciferase assay in order to examine a link between the phenotype seen in the functional assays and a specific effect on transcriptional regulation of target genes. During this second part of the work I learnt the basics of ES cell culture, and some functional assays for ES cell self renewal under different experimental conditions. It has also been useful to learn how to plan and perform a scientific experiment.

In parallel with this main project, I also contributed to biophysical characterization of Nanog and this latter part of the work gave me further chance to learn new techniques and experimental approaches.



Overall, this summer studentship has been a great opportunity for my scientific development, since I had the chance to directly experience current issues of stem cell biology.

I feel I have improved my knowledge and my technical experience, in particular with respect to this research subject, which particularly interests me.

In summary, I think that this experience has been invaluable in my approach to my future career in research, as well as being an invaluable personal experience.

References

1. Niwa, H., How is pluripotency determined and maintained? Development, 2007 134(4): p. 635-46.
2. Chambers, I., D. Colby, M. Robertson, J. Nichols, S. Lee, S. Tweedie, and A. Smith, Functional expression cloning of Nanog, a pluripotency sustaining factor in embryonic stem cells. Cell, 2003 113(5): p. 643-55.
3. Loh, Y.H., Q. Wu, J.L. Chew, V.B. Vega, W. Zhang, X. Chen, G. Bourque, J. George, B. Leong, J. Liu, K.Y. Wong, K.W. Sung, C.W. Lee, X.D. Zhao, K.P. Chiu, L. Lipovich, V.A. Kuznetsov, P. Robson, L.W. Stanton, C.L. Wei, Y. Ruan, B. Lim, and H.H. Ng, The Oct4 and Nanog transcription network regulates pluripotency in mouse embryonic stem cells. Nat Genet, 2006 38(4): p. 431-40.
4. Chambers, I., J. Silva, D. Colby, J. Nichols, B. Nijmeijer, M. Robertson, J. Vrana, K. Jones, L. Grotewold, and A. Smith, Nanog safeguards pluripotency and mediates germline development. Nature, 2007 450(7173): p. 1230-4

Discovering post-developmental Rho signalling pathways

Mai Kurihara, Pharmacology student, University College London, working in Stephen Nurrish's lab, MRC Laboratory for Molecular Cell Biology, University College, London

Dr Stephen Nurrish's lab uses the model organism *Caenorhabditis elegans* to study signalling by Rho GTPases, thus, allowing them to study Rho in a whole animal. Previous work has demonstrated a role for Rho in many developmental processes, but the Nurrish lab has used an inducible expression system to alter Rho signalling only in adults to discover what role Rho plays after an animal has developed and become an adult. In *C. elegans* there is only one RhoA ortholog, RHO-1. Expressing activated RHO-1 (RHO-1* in the adult *C. elegans* nervous system stimulates locomotion. In neurons RHO-1 acts downstream of the Gq trimeric G-protein to increase acetylcholine (ACh) release onto the muscles and thus increase locomotion. One way RHO-1 increases ACh release is by inhibiting diacylglycerol kinase-1 (DGK-1) and thus increases diacylglycerol (DAG) levels, DAG stimulates neurotransmitter release in both C. elegans and mammals. However, RHO-1 also appears to increase ACh release via a DGK-independent pathway. The aim of my experiment was to identify genes in this DGK-independent Rho signalling pathway via a genetic approach. Increases in ACh release by RHO-1 makes animals hypersensitive to acetylcholinesterase inhibitors (e.g. aldicarb) causing animals to paralyze and eventually die. For example, animals expressing activated RHO-1 die on 0.2mM aldicarb whereas wildtype animals show long term resistance. Therefore, by mutagenizing the RHO-1(G14V) animals and then identifying those that survived on 0.2mM aldicarb, I could hopefully find mutations in genes acting downstream of RHO-1 which would block the increase in ACh release and subsequently lead to survival on 0.2mM aldicarb.

To do this, RHO-1(G14V) animals were mutagenized using EMS and their mutagenized progeny were exposed to 0.2 mM aldicarb and a week later, I identified animals that were still alive and placed them on their own plate to produce progeny. Those animals that produced progeny were screened for aldicarb resistance at both 0.2 mM and 1 mM aldicarb (a concentration that paralyzes wildtype animals after approximately 90 minutes while animals expressing activated RHO-1 paralyze after 30 minutes due to their increase in ACh release).

Expression of RHO-1* in adults causes many effects in addition to changes in neurotransmitter release. This includes a reduction in fertility, thus, it was difficult to generate lots of mutagenized animals. Of 304 animals tested nine fertile animals were resistant to 0.2 mM aldicarb. Upon retesting only one of these animals (2.7) was able to survive on 0.2 mM aldicarb. Al also performed a second screen to identify more mutants but I was not able to complete the screen by the end of my time in the lab.

Mutant 2.7 is a candidate for a downstream RHO-1 effector that is required for RHO-1 to increase levels of neurotransmitter release. The next step is to map this mutation and identify the corresponding gene. Once the gene is identified studies can then be carried out to determine if the protein product of this gene is involved in a Rho signalling pathway.

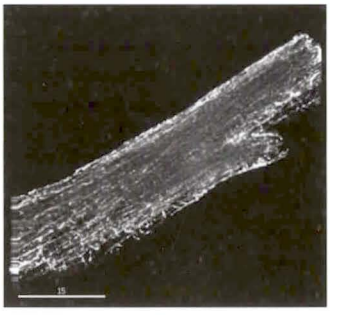
In humans, defects in Rho regulators and effectors have been implicated in mental retardation. It has been thought that these mutations cause developmental defects in the human brain, but research from the Nurrish lab suggests that defects in the adult brain due to defective Rho signalling can also occur. Genetic screen such as this one funded by the BSCB will determine the Rho signalling pathways involved and will tell us more about the role of Rho GTPases in adults in general and its role in the nervous system in particular.

A functional analysis of alpha-tubulin 8

Clare Wishart, Biochemistry with Molecular Biology student, University of Leeds working in Michelle Peckham's lab, University of Leeds.

During the summer of 2008, from the 30th June to the 22nd August, I was given the opportunity to work alongside Michelle Peckham and her research group in the FBS at Leeds University. My project was on alpha-tubulin 8 (tuba8), (one of the most elusive isoforms of α-tubulin) to see what its function is if it incorporates into microtubules. It is the most divergent out of all the alpha tubulin isoforms, has a C-terminal phenylalanine instead of tyrosine, and does not have a lysine residue at position 40, which is the residue that is acetylated in alpha tubulin 1. We used GFP or mCherry tags to investigate the localisation of tuba8 in different cells, and mutated the F to a Y to see if this would alter its cellular location. Initial results were inconclusive, but finally, in the last week, we came out with some interesting results, suggesting that it only incorporates into microtubules in specific cell lines,. The studentship has taught me what it is like to be a researcher; experiments are never 100% guaranteed to go right, in fact, 90% of the time things go very wrong. One must be patient and learn from mistakes.

I am extremely grateful for the opportunity to gain such experience in a laboratory environment, working in a small research team. It has given me great insight for the future; I have worked with PhD students, post docs and supervisors of research facilities, I have found that there is a stable career path in the academic route of science other than lecturing! It has also helped me decide that I definitely want to do a PhD. I was a bit dubious before-after trying out a related field of research. The project has also helped me to narrow down the numerous options for choosing a project. I have learnt such a varied assortment of scientific tools and techniques that have paved the foundations for the future. Working in a research facility was so much more informative than practical sessions in the teaching laboratories. I would suggest it being mandatory for every student going into a lab based final year project to spend a little time in a real lab to get ready for forthcoming projects. The funding throughout the project was greatly appreciated, as I could get by during the summer without money troubles, or having to get a second job to tide me over which would have compromised my ability to focus on the project. This was a very positive experience that I have gained much from, thank you for the opportunity.



The p53-dependent subcellular localisation of NDRG1 during the cell-cycle

Nevan Joyce, Medical student, Queen's University Belfast, working in the lab of James Murray, Centre for Cancer Research & Cell Biology, Queen's University Belfast.

During my second semester in the School of Medicine at Queen's University, I met Dr. James Murray in the Centre for Cancer Research and Cell Biology (CCRCB), in tutorials on "Chemicals in the environment and cancer". After the tutorial, we usually discussed potential career opportunities and I expressed my interest in a career in academic research. Medical degrees do not always provide sufficient opportunities to try laboratory based research, but we had discussed summer studentships and Dr. Murray suggested that I apply for a BSCB summer studentship on a project that he had already written as a potential studentship.

I started my project in July which was entitled "*Is the localization and phosphorylation of NDRG1 influenced by p53 status?*".

N-myc downstream-regulated gene 1 (NDRG1) is a protein transcriptionally regulated by p53 and it is crucial for p53 dependent apoptosis and the mitotic spindle checkpoint. The Murray lab had previously shown that NDRG1 was phosphorylated by two protein kinases, SGK1 and GSK3ß.

The aim of my project was to determine if p53 status in colorectal cells affected the phosphorylation NDRG1 and its localization. During the first couple of weeks I learnt various techniques that I needed for my project; this was the first time I had worked in a laboratory and although I was eager to learn I was also uncertain about what to expect and whether I was able to work independently.

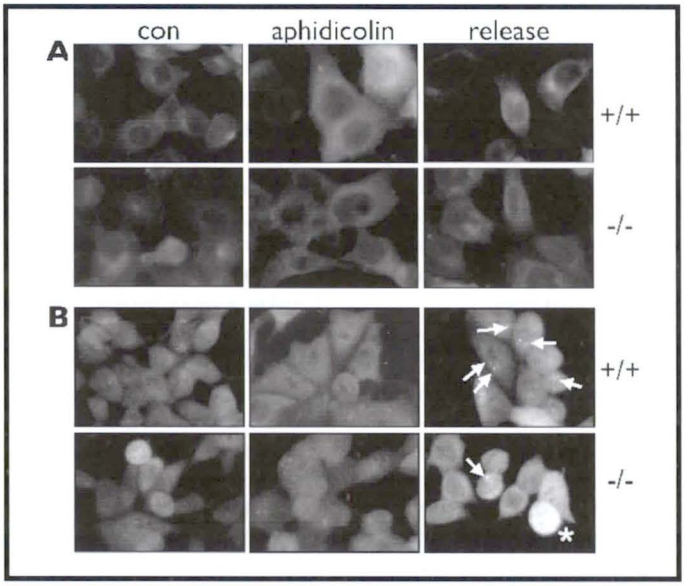
The model cell system I used for my studies was the human colonic tumour cell lines HCT 116 that had either wild-type p53 levels, or had lost p53 expression. I rapidly got to grips with cell culture and was able to begin the immunocytochemistry experiments by the second week. Overall my studentship generated a number of important findings.

Firstly, total NDRG1 levels and distribution in both p53 wild-type and null cells were the same, in contrast to previously published data reporting NDRG1 as a p53 transcriptional target.

Secondly, the pattern of phosphorylated NDRG1 staining formed distinct punctate foci in the cytoplasm, reminiscent of endosomal staining. This observation is consistent with a previously published paper reporting NDRG1 as a Rab4a interacting protein. My data would suggest that NDRG1 expression is not transcriptionally regulated in HCT116 cells by p53 and that NDRG1 phosphorylation may be important for this interaction.

Overall, my studentship was successful and the data that I generated will be used in future grant applications to investigate the function of NDRG1 in colorectal cancer.

During my eight weeks, I reported my findings to Dr. Murray and during my final week I gave a talk at their weekly lab meeting, which was nerve-racking, but overall enjoyable. In previous weeks I had observed the lab meetings presented by other members of the team and I gained a better understanding of how laboratory work progresses, including both the highs and lows, and in particular what being a Ph.D. student means in a laboratory.



Above: NDRG1 localisation in HCT116 cells is predominantly cytosolic, while phosphorylated NDRG1 adopts a punctate cytosolic distribution. In this experiment cells were grown on glass coverslips and treated with aphidicolin for 20 hours before release from their G1/S block for 8 hours in full media. Allthough tNDRG1 localisation was similar in p53 +/+ and -/- cells with predominately cytosolic and some nuclear staining, the localisation of phosphorylated NDRG1 showed a distinct punctate morphology (arrows) in addition to a diffuse cytosolic and nuclear distribution. In a number of cells that were in mitosis, phosphorylated NDRG1 was present throughout the cell (asterisk). The identity of the punctate structures to which phosphorylated NDRG1 localises is not known, but reminiscient of endosomal staining and correlates with previous reports that NDRG1 associated *in vivo* with the endosomal protein Rab4. Cells were fixed in 4 % PFA and blocked using 5 % BSA. Cell were immunostained with antibodies that recognise tNDRG1 (A) or p3xThr (B). Images were acquired on an inverted Leica microscope with a x63 magnification air lens using Leica LAF software and processed using ImageJ.

At times I was frustrated when an experiment failed, but these were overshadowed by the times when results told us something new and I realised that my work was contributing to a bigger picture. Seeing the other lab members dealing with these same issues, made me feel like I wasn't alone.

The BSCB summer studentship has given me an important and valuable opportunity to make up my mind about considering a career in medical research. Like the majority of medical students, I had not considered this as a future career. My time in the Murray lab has been a very positive experience and I would like to thank Dr. Murray for supporting my application, the BSCB for funding and the members of the Murray lab, especially Dr. Catherine McCaig, for all their time and effort in making my studentship thoroughly enjoyable.

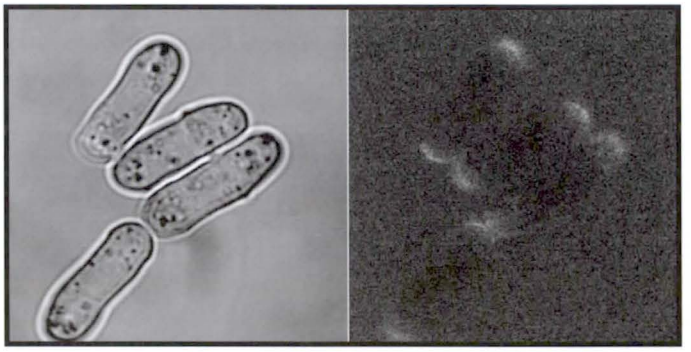
Functional Genomics and Mechanisms of Mycelial Differentiation in Fission Yeast

Sittiga Hassan, Molecular Medicine student, University of Sussex, working in John Armstrong's lab, Faculty of Life Sciences, University of Sussex.

I have always been interested in HIV; this interest stemmed from my work experience at a GP surgery where I encountered a patient who had been recently diagnosed with the virus, it was an emotional experience but made me realise I knew little about the virus itself. This sparked an interest in understanding about opportunistic infections related to HIV infection, particularly fungal infections. Most fungal infections are harmless, for example, Candidiasis which is a common fungal infection caused by *Candida albicans* and is found in all healthy people. However, in those that are immunosuppressed; Candida can get out of control and cause infection in the mouth, throat and vagina. This is just one illustration of where a seemingly harmless infection in normal individuals can have dire consequences in those affected by HIV. When I discovered there was the opportunity to work in the laboratory at Sussex University investigating a potential cure for such fungal infections I applied for a studentship and was fortunately awarded one for 8 weeks by the British Society of Cell Biology. This was an interesting and valuable experience.

During this time research was focused on exploring the fission yeast *S. pombe* and how this organism is able to switch from single-celled yeast to multicellular mycelium which happens as part of infection by pathogenic fungi such as *Candida*. This yeast was selected because not only does it act as an efficient model organism for more harmful fungi but it also shares many of the same cellular functions and pathways with humans and other higher eukaryotes. Human versions of a number of yeast cell cycle and DNA repair genes have been found to be directly involved in human cell division therefore studying the control of cell division in yeast is very relevant to human health and understanding many clinical disorders.

In previous work (Amoah-Buahin *et al*, 2005) it was found that under appropriate conditions (limited nitrogen) *S. pombe* can form extensive and invasive hyphae (demonstrated by resistance of some of the colony to washing). During my time in the laboratory, I was to investigate the *Rga8* gene a Rho-type GTPase activating protein (GAP). *Rga8* was chosen because mutants lacking this gene were found to be hyperinvasive making *Rga8* an interesting gene to investigate. The first week of my studentship involved comprehensive background reading and bioinformatics. It became apparent during my research that the GTPase that *Rga8* interacts with was unidentified leading to the formation of the first task for me to carry out during my research; to identify the GTPase that was inactivated by *Rga8*. In order to do this the 'TAP-tagging' method was to be employed; this involved Cre Recombinase-mediated cassette exchange (RMCE). The 'cassette' consisted of the *S. pombe* *Ura4*$^+$ selectable marker flanked by a wild-type loxP site at one end and by a modified heterospecific lox site (M3) at the other. In order to carry out the cassette exchange for C terminal tagging, I was required to design the 'Base Strains'; the 100 nucleotide gene specific portion of the forward primer corresponded to the C-terminal codons of *Rga8*, ending just upstream of the stop codon and the 100 nucleotide gene-specific portion of the reverse primer corresponded to the 3' untranslated region of *Rga8*,



ending just downstream of the stop codon. This base strain was successfully created using standard homologous recombination techniques and confirmation that the loP-*Ura4*$^+$-lox M3 Cassette was successfully flanking Rga8 was established using PCR. This appeared a suitable place to pause this division of my summer research although currently a 3rd year project student is carrying out the remainder of this experiment and I look forward to observing the results they obtain.

As some aspects of my main project took many days to complete (e.g. waiting for cultures to grow) I was able to work on two other 'side' projects during my time in the laboratory. The first was to create 'double mutants' i.e. *S. pombe* strains which lacked both *Rga8* and hypoinvasive gene mutants. This was essentially to observe which phenotype 'won' when the cultures were plated i.e. would invasive growth be hyperinvasive/hypoinvasive/ or as normal. This project involved primer design, PCR, colony plating and random spore analysis. Double mutants were successfully generated although currently a 3rd year project student is continuing analysis of the results.

The final project was to mate a Tea1-GFP strain of *S. pombe* with an Rga8 mutant strain and observe the effect the mutation had (if any) on the *S. pombe* cells. Tea1 is a kelch repeat protein required for proper regulation of cytoskeletal organisation and polarised growth in *S. pombe* making Tea1 an attractive protein to study in the field of invasive growth. The result of the mating was observed using a confocal microscope; an incredible experience as I had never before had access to the confocal microscope therefore I felt very privileged to know that one was being used for my own research. The results from this project were very clear and quickly obtained; an *Rga8* mutant did not have any significant effect on the phenotype of Tea1-GFP *S. pombe* cells.

Overall, I am very thankful for the opportunity that the BSCB gave me to work in a laboratory this summer. I feel confident now that I could work independently in the laboratory and use my own initiative to design experiments, however, it also gave me a great insight into the future and made me realise that research is not something I want to pursue. Research requires patience, perseverance and dedication; it is also a very singular profession. In research, although you may work as part of a research team, you are still very much on your own, there is limited social contact, results may take months, even years to achieve and nothing ever seems to go as planned; for these reasons I do not believe research is a path I wish to follow in the near future.

Reading between the lines – A guide to critically analyzing journal papers.

Jay Stone

I have only been doing my PhD for a short amount of time but I have quickly realized that to work in science you need to keep up with advances in your chosen field and be aware of new the techniques at your disposal. But this can be easier said then done, there are so many papers published a week that sometimes attempting to stay up to date can feel like a full-time task in its self. This information overload is often caused by attempting to read all the papers applicable to us in great detail, so I have sought advice on how you can sift through those papers to get the most out of them. I hope that this not only cuts down the amount you have to read and so the time you have to spend doing it but also that these tips could help direct you're reading to help your research progress.

Ideally a book would have no order to it, and the reader would have to discover his own.
~ Raoul Vaneigem ~

After talking to people about how they read papers one thing has stood out for me. It seems that when we start reading journal articles the general view that reading should start at the beginning and continue in a linear progression until you reach the end conclusions, however as we advance through our scientific careers we develop our own order. For example when we are new to the field or wanting some background information it would be sensible to start with the introduction but when we are reading about our own well known topic we might want to skip to the results or methods to see what relates to us and what we could use in our work.

Another point that this quote by Raoul Vaneigem links to is that near enough all journal articles are written from the authors' point of view, derived from their own hypothesis. The introduction will be geared to pointing you towards their views and their data interpretation will undoubtedly be observed with their predictions in mind. This is understandable as everyone has their passions and beliefs regarding their work but it can make it hard for you to come to your own conclusions on what the data is showing you. Sometimes the best way of overcoming this is to look at the result figures first, make your own notes stating what you think you would deduce from the results and then read the result discussion and see how their interpretations agree or differ.

To read without reflecting is like eating without digesting.
~ Edmund Burke ~

As the weeks go by and your reading pile grows ever taller it is quite easy to feel as though you have been productive by diving in and reading for hours but if you do not make notes or summarize your reading then all you have really done is wasted your time. You need to engage with what you are reading, make short bullet listed notes which can summarize the main findings of the paper, then set about establishing if this links in with any of your work and assessing whether these new findings effect what you are looking at. If they do you might want to look at the methodology more closely so you could repeat their techniques in your system.

The only true wisdom is in knowing you know nothing.
~ Socrates ~

Now obviously no-one wants to admit that we probably know very little about anything, we like to think we are finding answers to those never ending questions and in time science does have the capacity to be able to offer some answers or at least possible clues but we also need to remember that things can change depending on new findings and one thing generally considered central dogma needs to be flexible to cope with new information. If you read papers which disagree with each other both could be right to a degree, it is up to you to pull out the information you need to work with from each paper, try not to be swayed by the paper that agrees with your opinion.

If you believe everything you read, better not read.
~ Japanese proverb ~

Everyone is under pressure to publish: it gets your name known, it helps with grant applications, this in itself gets more people into your lab so you can be more productive and maybe publish more; thus, it is a circular motion.
All papers have to pass the review stages in which they have to meet the journals own set standards as well as being deemed novel to the area of interest, but that doesn't mean that mistakes can't be made. It is important that you really look at the data and what is being suggested. Do their primer sequences blast to any other sequences? Have they done all the appropriate controls i.e.: scrambled RNA for RNAi experiments, GFP alone for transfections, non-template controls for PCR? Have they tested their findings in a range of ways i.e.: have they show protein interactions via fluorescent labeling and co-immunoprecipitations? Have they shown these interactions occur in a range of cell lines or in vivo sections? Do their western blots look clean?

A truly solid scientific paper is worth its weight in gold if it can help you with what you are doing and don't forget some papers have correspondent authors for any questions you might have, to not use this resource would be a terrible waste!

All that glitters is not gold
~ J R R Tolkien ~

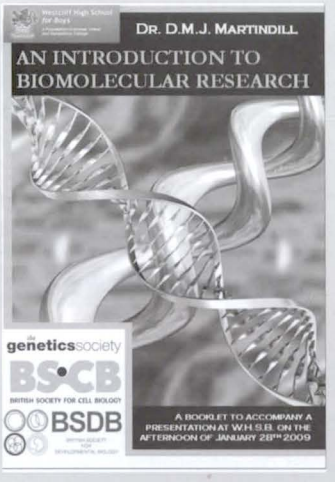
There are lots of journals out there and they have been graded into different impact factors. It is generally considered that the higher the impact factor the better the journal but that doesn't mean that all the papers in the low impact factors are worthless and all the papers in the top journals are the best to read. The only things to consider when you are thinking about reading a paper is whether it relates to your work, whether it can help you progress in your research and whether it is put together by good solid well controlled science.

The general consensus about how you read a paper and how you apply it to your work is that it is very much a personal thing. As your knowledge of an area grows so will your ability to chose the right papers but until then the best quote for any PhD student I think is...

Read, read, read.
~ William Faulkner

Back to School

David Martindill, Institute of Child Health, London



I did something out of the ordinary one drizzly afternoon in January. Seven years after receiving my exam results and walking out of its doors for the final time, I returned to my old secondary school. But this was not just a trip down memory lane. After reacquainting myself with some members of staff, I stepped to the front of a lecture theatre in which I was once taught myself. My aim? To inspire the Sixth Form students to consider a career in biomolecular research.

In recent years, public engagement in science has become a major focus for research funding bodies and universities. Scientists are now expected to explain and justify their research to the public, be it through opening their faculty doors and hosting open days or by hanging up their lab coats and venturing out into the wider world themselves. I recently completed my PhD in molecular biology at the Institute of Child Health in London. The opportunity to undertake a school outreach project emerged during my final year, but the workload during the months leading up to its conclusion precluded anything other than desperate final experiments and days devoted to writing my thesis. A short break from research after my viva examination proved the perfect time to organise such an event.

Westcliff High School for Boys is a successful Grammar School and Sixth Form College in Essex that has achieved a rating of outstanding in its last three Ofsted inspections. A significant proportion of its pupils go on to read biological sciences at university and the school is eager to avoid the nationwide trend of falling numbers of A-level science candidates. The school places importance on broadening the education of its students beyond the syllabus and offers extra-curricular activities to instil in them the belief that science is both interesting and rewarding. In recent years the school has hosted talks from university professors and has arranged scientific workshops and day trips, catering for so-called gifted and talented students and those with the highest ambitions. The School's Headmaster, Mr. Andrew Baker, therefore needed little persuasion to host my presentation.

The event was impressively attended. A gathering of boys were joined by a number of girls from neighbouring Westcliff High School for Girls. All attendees were provided with a booklet that I had written to accompany the presentation, the printing and binding of which was generously sponsored in part by the BSCB. I also drew attention to the softCELL e-learning pages on the BSCB website, a useful cell biology resource for schools and colleges. The talk itself was tripartite, being divided into a starter, main body and a plenary. In the starter, students were given an overview of the fundamentals of molecular biology, from the importance of the discovery of the structure of DNA and the cracking of the genetic code to the efforts spent in sequencing and now deciphering the human genome. I then moved on to discuss a number of seminal papers, from the discovery of Hox genes and the emergence of developmental biology in the 1980s to the sequencing of the genome of the extinct woolly mammoth last year. Recently, several examination boards have updated their A-level biology specifications and, pleasingly, have placed more of an emphasis on cell and molecular biology. Chapters devoted to cell division, differentiation and death now appear in textbooks alongside the more traditional branches of biology such as anatomy and ecology. Students were therefore better placed than they may have been in the past to follow my stories about the discovery of oncogenes, the cellular basis of ageing and the predicted therapeutic uses of stem cells in medicine. I followed with a description of my own research findings and used this section of the talk to demystify the intimidating format of a research paper. The presentation concluded with an overview of the university application process and offered advice about bolstering one's application to read a bioscience degree. During the plenary I was keen to emphasise the benefits of pursuing a scientific career. I told of the excitement that accompanies making a novel finding in research and proposed the genuine possibility that some students in the room could contribute to our understanding of biology in the future.

Research is as fast moving in the world of education as it is in the world of cell biology. Learning theories emerge and evolve and these influence the techniques used by teachers in the classroom. For me, the greatest challenge of the afternoon was to present the findings of recent research papers using a language and style accessible to pre-degree students. Using relevant analogies, anecdotes and associations to other subjects, I embarked on explaining the findings of these studies in a way I had not attempted before. Instead of presenting the facts alone, I brought the authors to life, highlighted their reasoning for dedicating their time to these studies and how their findings have advanced our understanding of biology. I included PowerPoint slides full of quotes, images and video clips, and members of the audience were encouraged to actively refer to links in the booklet. As far as possible, I tried to avoid some of the jargon that has become basic vocabulary in cell biology. I also made a concerted effort to modify my speaking style, favouring a slow pace and modulating my tone, while at the same time maintaining enthusiasm in my voice. Queries from the audience were a useful gauge of their understanding and I paused periodically to assess this. Reassuringly, the high quality of the questions left me satisfied that I had pitched the material at the right level.

Feedback from the event was very positive. A questionnaire was circulated during the talk and in more than a few cases attendees who were not interested in biomolecular research prior to the presentation now voiced an intention to consider it as a career. After the plenary, I was approached by several members of the audience who expressed a desire to read further about several of the topics I had covered. I floated the idea that they conduct a literature review and I am now shadowing a number of students as they write a review article. Anthony Davey and Harry Tresidder, two members of year 12 who are hoping to read either medicine or a degree in bioscience, were keen to provide me with some sound bites. "I particularly found useful the advice you gave regarding strengthening our university application," said Harry. Anthony agreed. "Some of the recent scientific findings you presented will be invaluable material to discuss at university interviews." On a more personal level, the event had lived up to my expectations and I left my old school satisfied once again. The day had reaffirmed my passion for communicating science and was a useful experience as I consider my post-PhD future.

Forthcoming meetings

Further information is available at www.bscb.org/?url=meetings/relatedmeetings

2009

13–24 Apr
EMBO Practical Course: FRET, FLIM, FCS, FRAP and 3-D Imaging; Application to Cell and Developmental Biology
Institute of Medical Biology – A*STAR Singapore

18–22 Apr
American Association of Cancer Research - AACR 100th Annual Meeting
Colorado Converntion Center, Denver, CO

23–24 Apr
Bipolar Disorder: molecular and cellular biology
Royal Holloway University of London

18–23 May
Fluorescence (cross-) correlation spectroscopy (FCS/FCCS) for cell biology applications
Heidelberg, Germany

23–28 May
Cell polarity and membrane traffic
Sant Feliu de Guixols, Spain

1–7 June
Electron tomography in life science
Leiden, Netherlands

8–19 June
Molecular and Cellular Membrane Biology
Cargese, Corsica

15–17 June
Advances in stem cell research: Stem cells, systems and synthetic biology
Cambridge, UK

17–21 June
2nd European Small GTPase Conference
Aussois, France

4–9 July
FEBS Congress 'Life's Molecular Interactions'
Prague, Czech Republic

5–8 July
Microenvironment, Motility and Metastasis
Glasgow, Scotland

8–11 July
International Society for Stem Cell Research (ISSCR) 7th Annual Meeting
Barcelona, Spain

21–24 July
Neuronal glutamate and GABA-A receptor function in health and disease
St Andrews University, UK

16–25 Aug
Molecular Mechanism of Signal Transduction and Cancer
Spetses, Greece

29 Aug
The EMBO Meeting 2009
Amsterdam, Netherlands

2–4 Sept
Synaptopathies: dysfunction of synaptic function
Newquay, Cornwall, UK

5–10 Sept
Protein Modules and Networks in Health and Disease
Seefeld, Austria

6–10 Sept
16th International Society for Developmental Biologists Congress
Edinburgh, Scotland

9–13 Sept
The Physics of Cells
Dubrovnik, Croatia

12–16 Sept
Antigen receptor signaling: from lymphocyte development to effector function
Certosa di Pontignano (Siena), Italy

16–20 Sept
Mitochondria in life, death and disease
Aussois, France

19–23 Sept
Meiosis
Isle sur la Sorgue, France

30 Sept
Nuclear structure and dynamics
Isle sur la Sorgue, France

8–16 Oct
Current methods in cell biology
Heidelberg, Germany

25–30 Oct
9th International Plant Molecular Biology Congress
St. Louis, MO, USA

5–9 Dec
ASCB 49th Annual Meeting
San Diego, CA

miim

Mucosal Immunology and Intestinal Microflora

European Postgraduate Symposium
9th June 2009, Norwich Research Park, Norwich, UK

Delegates are now invited to submit abstracts

This 1 day symposium is aimed at bringing together postgraduate students that work in aspects of gut immunity, host-pathogen interactions within the gut and the use of probiotics. The event will provide an ideal opportunity to interact with fellow students and exchange ideas with those who work in a similar field of research. Confirmed keynote speakers include Professor Michiel Kleerebezem from Wageningen University in the Netherlands, Professor Justin Sonnenburg from Stanford University in the USA and Professor Thomas MacDonald from Queen Mary's School of Medicine and Dentistry in London who are experts in the field of gut microbiology.

Postgraduate students are invited to participate during the symposium by either giving a presentation or presenting a poster to an audience of postgraduate students, post docs and principal investigators, who are also invited to attend. A registration fee of £65 will include refreshments throughout the day, lunch, a social dinner and transport to the evening event. Travel grants will be offered to those who are presenting and prizes for the best 4 posters will be also be awarded. For further details and registration please visit www.ifr.ac.uk/gutsymposium2009.

2010

22–27 Aug
14th International Congress of Immunology
Kobe, Japan

4–7 Sept
The EMBO Meeting 2010
Barcelona, Spain

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

Sciences du Vivant - Environnement et Développement durable

CONFÉRENCES JACQUES-MONOD

« Small GTPase Conference »

June 17-21, 2009

Aussois, France

Chairperson: Anne Debant, Montpellier, France

Vice-Chairpersons: Jacqueline Cherfils, Gif sur Yvette, France

Mike Williams, Aberdeen, UK

Confirmed speakers:

B. Antonny, D. Bar-Sagi, A. Blangy, JL Bos, X. Bustelo, J. Collard, JF Coté, C. D'Souza-Schorey, J. Donaldson, M. Famulok, C. Gauthier-Rouviere, B. Hoflack, A. Houdusse, C. Jackson, C. Kiel, N. Lamarche-Vane, G. Loirand, A de Matteis, C. Marshall, O. Pertz, A. Ridley, C. Roy, C. Sikes, L. VanAelst, M. Way

http://www.cnrs.fr/sdv/cjm/

CANCER RESEARCH UK

Beatson International Cancer Conference

Co-sponsor ASSOCIATION FOR INTERNATIONAL CANCER RESEARCH

Microenvironment, Motility and Metastasis

Sunday July 5 – Wednesday July 8 2009 Glasgow, Scotland

Speakers and Sessions

Keynote Address: Joan Massagué (US)

Adhesion and Migration I: Phillippe Chavrier (FR), Paolo Di Fiore (IT), Robert Insall (UK), Chris Marshall (UK), Ann Marie Pendergast (US), Michael Olson (UK)

Adhesion and Migration II: Channing Der (US), Frank Gertler (US), Mark Ginsberg (US), Rick Horwitz (US), Laura Machesky (UK), Jim Norman (UK)

Microenvironment: Holger Gerhardt (UK), Doug Hanahan (US), Kairbaan Hodival-Dilke (UK), Raghu Kalluri (US), Harold Moses (US), Valerie Weaver (US)

Invasion and Metastasis: Lionel Larue (FR), David Lyden (US), Gordon Mills (US), William Muller (CA), Brad Ozanne (UK), Owen Sansom (UK)

Imaging, Invasion and Metastasis: Kurt Anderson (UK), Peter Friedl (DE), Erik Sahai (UK), Jeffrey Segall (US), Zena Werb (US)

Aims of the conference

The conference will focus on the recent advances in imaging and model tumour systems which have greatly enhanced our ability to investigate the mechanisms of motility, invasion and metastasis. This conference will highlight these advances and their role in translational research, which will lead to the development of novel cancer diagnostics and therapeutics.

Short talks will be granted to the authors of outstanding abstracts. Some financial assistance will be available to presenters of these short talks through sponsorship from the Association for International Cancer Research.

Website, on-line registration, payment and abstract submission: http://www.beatson.gla.ac.uk/conf

For additional information please contact:
Tricia Wheeler, Conference Co-ordinator, Beatson Institute for Cancer Research,
Garscube Estate, Switchback Road, Bearsden, Glasgow G61 1BD, UK

Tel: +44 (0) 141 942 0855 Fax: +44 (0) 141 330 6426
email: t.wheeler@beatson.gla.ac.uk

Deadline for registration, payment and abstract submission: May 8 2009

the Beatson institute for cancer research

AICR *Cancer knows no boundaries. Fortunately, neither do we.*

CANCER RESEARCH UK

International Society for Developmental Biology Congress 2009

Edinburgh International Conference Centre, Edinburgh
6–10 September 2009

Even though it may still seem a long way off, planning for this showcase meeting is well advanced. The spotlight of the developmental biology world will be on Britain and it is very important for BSDB and for British developmental biology that this meeting is a big success. Up to 1500 participants are anticipated, and we envisage that every UK developmental biologist will want to attend.

Programme includes:

- Stem Cells and Medicine
- Stem Cells and Pluripotency Regeneration
- Non-coding RNA in Development
- Mechanisms of Morphogenesis
- Morphogenesis and Birth Defects
- Organogenesis
- Growth Control and Tumours
- Advances in Imaging Technologies
- Cilia in Development and Disease
- Asymmetry in Cells
- Asymmetry in Organisms
- Darwin and Development 2009
- Early Neural Development
- Behaviour and Neural Circuits
- Cell Migration
- Signalling in Development
- Modelling and Networks
- Chromatin and Epigenetics
- Late Breaking News

The programme for the ISDB 2009 Congress will represent the state of the art in developmental biology. Beyond the core topics of the field, features will include a spotlight on stem cells and the medical implications of developmental biology. There will also be an emphasis on the genetics and cell biology of development, and to this end, the British Society for Cell Biology and the Genetics Society will both host symposia as part of the main programme of events.

International Society for Stem Cell Research

ISSCR

7th ANNUAL MEETING

The world's premier stem cell research event

First Announcement

July 8–11, 2009

Centre Convencions Internacional Barcelona
Barcelona, Spain

www.isscr.org

Co-sponsored by

BOSTON UNIVERSITY

Boston University School of Medicine
Continuing Medical Education

Joint Sponsor for Continuing Medical Education

CRG Centre de Regulació Genòmica

CMR[B]

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: _____

Committee Members 2009

President
Professor Clare Isacke
Breakthrough Breast Cancer Research Centre
Institute of Cancer Research
237 Fulham Road
London SW3 6JB
Tel: 020 7153 5510
Fax: 020 7153 5340
Email: clare.isacke@icr.ac.uk

Secretary
Professor Elizabeth Smythe
Department of Biomedical Sciences,
University of Sheffield,
Western Bank,
Sheffield S10 2TN
Tel: 0114 2224635
Email: e.smythe@sheffield.ac.uk

Treasurer
Professor Adrian Harwood
Cardiff School of Biosciences
Biomedical Building
Museum Avenue
Cardiff CF10 3US
Tel: 029 879358
Email: HarwoodAJ@cf.ac.uk

Meetings Secretary
Dr Kairbaan Hodivala-Dilke
The Cell Adhesion and Disease Laboratory
Tumour Biology Laboratory
Cancer Research UK Clinical Centre
Bart's & The London
Queen Mary's School Of Medicine & Dentistry,
John Vane Science Center,
Charterhouse Square,
London, EC1M 6BQ
Tel: 020 7014 0406
Fax: 020 7 014 0401
Email: kairbaan.hodivala-dilke@cancer.org.uk

Meetings secretary elect
Dr Andrew McAinsh
Marie Curie Research Institute
Chromosome Segregation Laboratory
The Chart
Oxted, Surrey RH8 0TL
Tel: +44(0) 1883 722306, ext: 271 (office), 259 (lab)
Email: a.mcainsh@mcri.ac.uk

Membership Secretary
Professor Dan Cutler
MRC Laboratory for Molecular Cell Biology
University College London
Gower Street
London WC1E 6BT
Tel: 020 7679 7806
Email: d.cutler@ucl.ac.uk

Newsletter editor
Dr David Stephens
Department of Biochemistry,
University of Bristol,
School of Medical Sciences,
University Walk,
Bristol BS8 1TD
Tel: 0117 928 7432
Email:
david.stephens@bristol.ac.uk
(to whom material should be sent – see guidelines for contributors)

Website Coordinator
Dr. Paul. D. Andrews
Stem Cell Technologies Programme
Drug Discovery Unit
Division of Biological Chemistry and Drug Discovery
James Black Centre
College of Life Sciences
University of Dundee
Dundee DD1 5EH
Tel: 01382 386 453
Email: paul@lifesci.dundee.ac.uk

Honor fell/COB Travel Award Secretary
Dr Jordan Raff
Cancer Research UK Group Leader
Wellcome Trust/CR-UK Gurdon Institute
University of Cambridge
Tennis Court Road
Cambridge CB2 1QR
Tel: 01223 334114
Email: j.raff@gurdon.cam.ac.uk

Committee members

Dr Vania Braga
Molecular and Cellular Medicine Section,
Faculty of Natural Sciences,
Imperial College London,
Sir Alexander Fleming Building,
London SW7 2AZ
Tel: 020 7594-3233
Email: v.braga@imperial.ac.uk

Professor Iain Hagan
Department of Biochemistry and Applied Molecular Biology
University of Manchester, and Cell Division Group
Paterson Institute for Cancer Research
Christie Hospital
Wilmslow Road
Withington
Manchester, M20 4BX
Email: ihagan@picr.man.ac.uk

Dr Margarete Heck
University of Edinburgh, CMVM
Queen's Medical Research Institute
Centre for Cardiovascular Science
47 Little France Crescent
Edinburgh EH16 4TJ
Tel: 0131 242 6694 (Office)
Tel: 0131 242 6707 (Lab)
Fax: 0131 242 6782
Email: Margarete.Heck@ed.ac.uk

Dr Richard Lamb
Chester Beatty Laboratories
Section of Cell and Molecular Biology
237 Fulham Road
London SW3 6JB
Tel: +44 (0)20 7153 5348
Email: richard.lamb@icr.ac.uk

Dr Sean Munro
MRC Laboratory of Molecular Biology
Hills Road
Cambridge CB2 2QH
Tel: (01223) 402236
E-mail: sean@mrc-lmb.cam.ac.uk

Dr Stephen Nurrish
MRC Laboratory for Molecular Cell Biology,
University College London, Gower St, London,
WC1E 6BT
Tel: 020 7679 7267
Email: s.nurrish@ucl.ac.uk

Dr Sylvie Urbé,
Department of Physiology,
University of Liverpool,
Liverpool
Tel: 0151 794 5432
Email: urbe@liv.ac.uk

Non-elected (co-opted) members

BSCB assistant
Margaret Clements
BSCB Assistant
The Company of Biologists Ltd.
140 Cowley Road
Cambridge CB4 0DL
Email bscb@biologists.com

Schools Liaison Officer
David Archer
43 Lindsay Gardens,
St.Andrews,
Fife,
KY16 8XD
Email: d.archer@talktalk.net

Sponsorship secretary elect
Dr Richard Grose
Centre for Tumour Biology
Institute of Cancer and the CR-UK Clinical Centre
Barts and The London School of Medicine and Dentistry
Ground Floor, John Vane Science Centre
Charterhouse Square
London EC1M 6BQ
Tel: 0207 014 0415
Email: r.p.grose@qmul.ac.uk

PhD student rep
Veronika Ganeva
The University of Edinburgh
Centre for Integrative Physiology
Hugh Robson Building
George Square
Edinburgh EH8 9XD
Tel: 0131 6503 102
Email:
veronika.ganeva@gmail.com

Postdoc rep
Dr. Sarah McClelland
Marie Curie Research Institute
Chromosome Segregation Laboratory
The Chart
Oxted, Surrey RH8 0TL
Tel: 01883 722306, ext: 271 (office), 259 (lab)
Email: S.McClelland@mcri.ac.uk

BSCB Ambassadors 2009

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.

City/ Institute	Ambassador	Contact
Aberdeen	Anne Donaldson	a.d.donaldson@abdn.ac.uk
Bath	Barbara Reaves	bssbjr@bath.ac.uk
Belfast	James Murray	j.t.murray@qub.ac.uk
Birmingham	John Heath, Feydor Berditchevski	J.K.HEATH@bham.ac.uk, f.berditchevski@bham.ac.uk
Bradford	Jason Gill	j.gill1@Bradford.ac.uk
Brighton	John Armstrong	j.armstrong@sussex.ac.uk
Bristol	Harry Mellor	H.Mellor@bristol.ac.uk
Brunel	Joanna Bridger	Joanna.Bridger@brunel.ac.uk
Cambridge	Jon Pines, Scottie Robinson	jp103@cam.ac.uk, msr12@mole.bio.cam.ac.uk
	Simon Cook	simon.cook@bbsrc.ac.uk
Canterbury	Martin Carden, Dan Mulvihill	m.j.carden@ukc.ac.uk, d.p.mulvihill@kent.ac.uk
Cardiff	Maurice Hallett, Adrian Harwood	hallettmb@cf.ac.uk, HarwoodAJ@cf.ac.uk
Clare Hall	Simon Boulton	simon.boulton@cancer.org.uk
Dundee	Angus Lamond	a.i.lamond@dundee.ac.uk
Durham	Roy Quinlan	r.a.quinlan@durham.ac.uk
Edinburgh	Bill Earnshaw, Margarete Heck	Bill.Earnshaw@ed.ac.uk, margarete.heck@ed.ac.uk
	Wendy Bickmore, Ian Chambers	W.Bickmore@hgu.mrc.ac.uk, ichambers@ed.ac.uk
Glasgow	Nia Bryant, Karen Vousden	n.bryant@bio.gla.ac.uk, k.vousden@beatson.gla.ac.uk
ICR	Clare Isacke	clare.isacke@icr.ac.uk
Imperial	Vania Braga, Amanda Fisher	v.braga@ic.ac.uk, amanda.fisher@csc.mrc.ac.uk
Kings/Guys	Simon Hughes	s.hughes@kcl.ac.uk
Leeds	Michelle Peckham	m.peckham@leeds.ac.uk
Leicester	Andrew Fry	amf5@leicester.ac.uk
LIF	Giampietro Schiavo	giampietro.schiavo@cancer.org.uk
Liverpool	Sylvie Urbe	urbe@liverpool.ac.uk
Ludwig	Anne Ridley	anne.ridley@kcl.ac.uk
Manchester	Charles Streuli, Iain Hagan	charles.streuli@man.ac.uk, IHagan@PICR.man.ac.uk
	Viki Allan	Viki.Allan@manchester.ac.uk
Marie Curie	Andrew McAinsh	A.McAinsh@mcri.ac.uk
Newcastle	Michael Whittaker	michael.whitaker@newcastle.ac.uk
NIMR	Peter Rosenthal, Jean-Paul Vincent	prosent@nimr.mrc.ac.uk, jp.vincent@nimr.mrc.ac.uk
Norwich	Grant Wheeler, Tom Wileman	grant.wheeler@uea.ac.uk, T.Wileman@uea.ac.uk
Nottingham	John Mayer	John.Mayer@nottingham.ac.uk
Oxford	Chris Hawes, James Wakefield	chawes@brookes.ac.uk, james.wakefield@zoo.ox.ac.uk
	Gillian Griffith	
Queen Mary	Mark Turner	m.d.turner@qmul.ac.uk
Reading	Jonathan Gibbins	j.m.gibbins@reading.ac.uk
Sheffield	Liz Smythe, Andy Grierson	e.smythe@sheffield.ac.uk, a.j.grierson@sheffield.ac.uk
Southampton	Malcolm East, Paul Townsend	j.m.east@soton.ac.uk, P.A.Townsend@soton.ac.uk
	Jane Collins	jec3@soton.ac.uk
St Andrews	Frank Gunn-Moore	fjg1@st-andrews.ac.uk
St Georges	David Winterbourne	sghk100@sghms.ac.uk
UCL	John Carroll, Patricia Salinas	j.carroll@ucl.ac.uk, p.salinas@ucl.ac.uk
Vet College	Nigel Goode	ngoode@rvc.ac.uk
York	Dawn Coverly	dc17@york.ac.uk

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, rtf or doc format. Please send images as 300dpi JPEG, TIFF or PSD files. If images are for the front cover, please send large, high-resolution CMYK files.

Submission of articles and images should be made to

Dr David Stephens
Department of Biochemistry,
University of Bristol,
School of Medical Sciences,
University Walk, Bristol BS8 1TD
Tel: 0117 928 7432
e-mail: david.stephens@bristol.ac.uk

Advertising Information

Single advertisement:

Back cover Black and White £275; Colour £425
Inside front cover Black and White £275
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: Costs are reduced by 30%.

Advertisements can by supplied on CD or by email. Please send as JPG, TIF or PSD at 300dpi, or as PDF (with fonts embedded).
Page size A4: 210x297mm.

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

For further information on commercial advertising contact:

Dr Richard Grose,
Centre for Tumour Biology,
Institute of Cancer and the CR-UK Clinical Centre,
Barts and The London School of Medicine and Dentistry,
Charterhouse Square, London EC1M 6BQ
Email: r.p.grose@qmul.ac.uk

BSCB Subscription information

Paying by direct debit:

Regular member £35
Student, school teacher, retired member £15

If you are still paying by standing order, please cancel it and set-up direct debit. Those members who do not wish to pay by direct debit or do not have a UK bank account should contact Margaret Clements bscb@biologists.com for advice.

New members should complete an online application form at www.bscb.org.

Postmaster and General Inquiries

Send changes of address, amendments and general queries to:

Margaret Clements
The Company of Biologists Ltd.
140 Cowley Road
CambridgeCB4 0DL
Tel: 01223 425525
E-mail: bscb@biologists.com

Invoices

Send to:

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

Journals

BSCB members are entitled to a range of discounts from journal and book publishers. These are correct at the time of going to press but members should check www.bscb.org for the latest information.

Offers include 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)

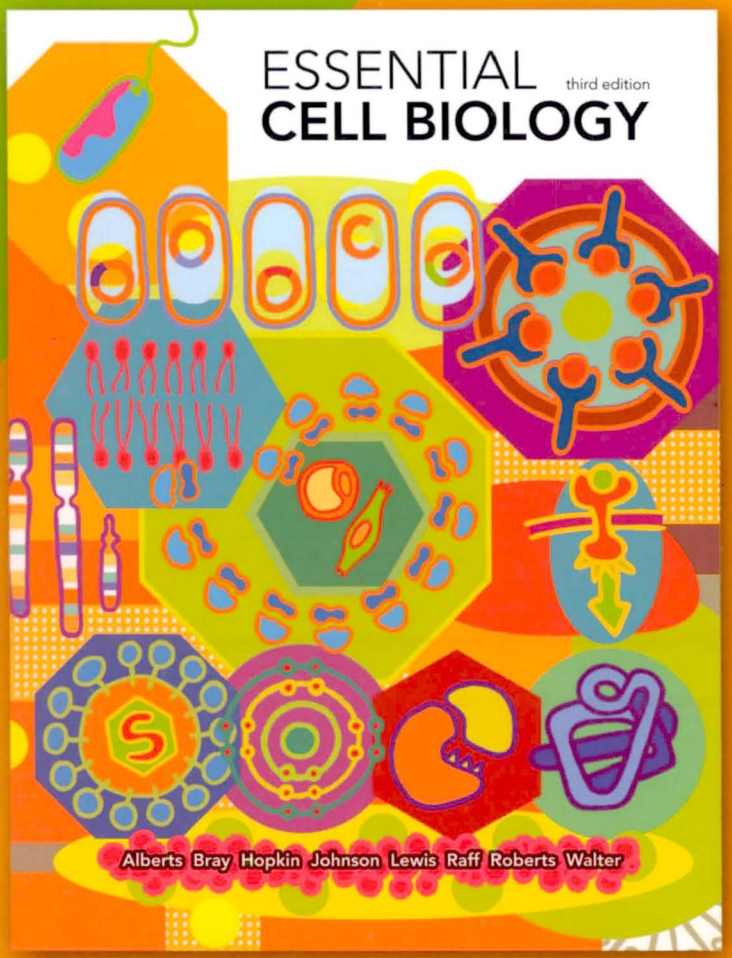
Journal	BSCB rate	Standard rate
The Anatomical Record	$150	*
BioEssays	$99	$160
Cell Motility and the Cytoskeleton	$150	$425
Developmental Dynamics	$125	$165
Genesis	$60	$99
Journal of Cellular Biochemistry	$350	*
Journal of Morphology	$175	*
Microscopy Research and Technique	$295	$595

* 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

NEW THIRD EDITION



ESSENTIAL CELL BIOLOGY

Essential Cell Biology provides an accessible introduction to the fundamental concepts of cell biology. Its lively writing and exceptional illustrations make it the ideal textbook for a first course in cell and molecular biology. The text and figures are easy-to-follow, accurate, clear, and engaging for the introductory student. Molecular detail has been kept to a minimum in order to provide the reader with a cohesive, conceptual framework of the basic science that underlies our current understanding of biology.

The Third Edition is thoroughly updated scientifically, yet maintains the academic level and size of the previous edition. The book is accompanied by a Media DVD-ROM with over 130 animations and videos, all the figures from the book, and a new self-test quizzing feature for students.

Bruce Alberts, University of California, San Francisco, USA
Dennis Bray, University of Cambridge, UK
Karen Hopkin, Science Journalist and Biochemist, USA
Alexander Johnson, University of California, San Francisco, USA
Julian Lewis, Cancer Research, UK
Martin Raff, University College London, UK
Keith Roberts, Emeritus, John Innes Centre, UK
Peter Walter, University of California, San Francisco, USA

Garland Science
April 2009 • 860 pages • 850 illustrations
Hardback • 978-0-8153-4129-1 • £90.00
Paperback • 978-0-8153-4130-7 • £45.00

NEW IN THE THIRD EDITION

- Completely updated throughout.
- Based on student and instructor feedback, the Third Edition now includes:
  - Integration of cell cycle and cell division into a single chapter.
  - Improved treatment of thermodynamics and energetics.
  - Integration of multi-media throughout text.
  - The addition of a quizzing feature to the Media Player.
- Greater focus on regulation, including new material on chromosome structure and epigenetics, post-transcriptional control (riboswitches, microRNAs, and RNAi), and metabolic controls.
- Additional attention to disease and medicine, including new material on quality control in protein production, cell-cell recognition, genetic variation, cancer treatments, and enhanced coverage of stem cells and their potential to treat disease.
- New treatment of genome evolution and comparative genomics.
- New coverage of modern recombinant DNA and cell visualization technologies.
- New "How We Know" sections.
- Revised Question Bank for instructors including questions that can be used with student response systems (i.e. clickers).

TEACHING SUPPLEMENTS

- The Art of Essential Cell Biology, Third Edition
- Figure Integrated Lecture Outlines
- Question Bank
- Media DVD-ROM
- Garland Science Classwire™

GS Garland Science
Taylor & Francis Group
www.garlandscience.com