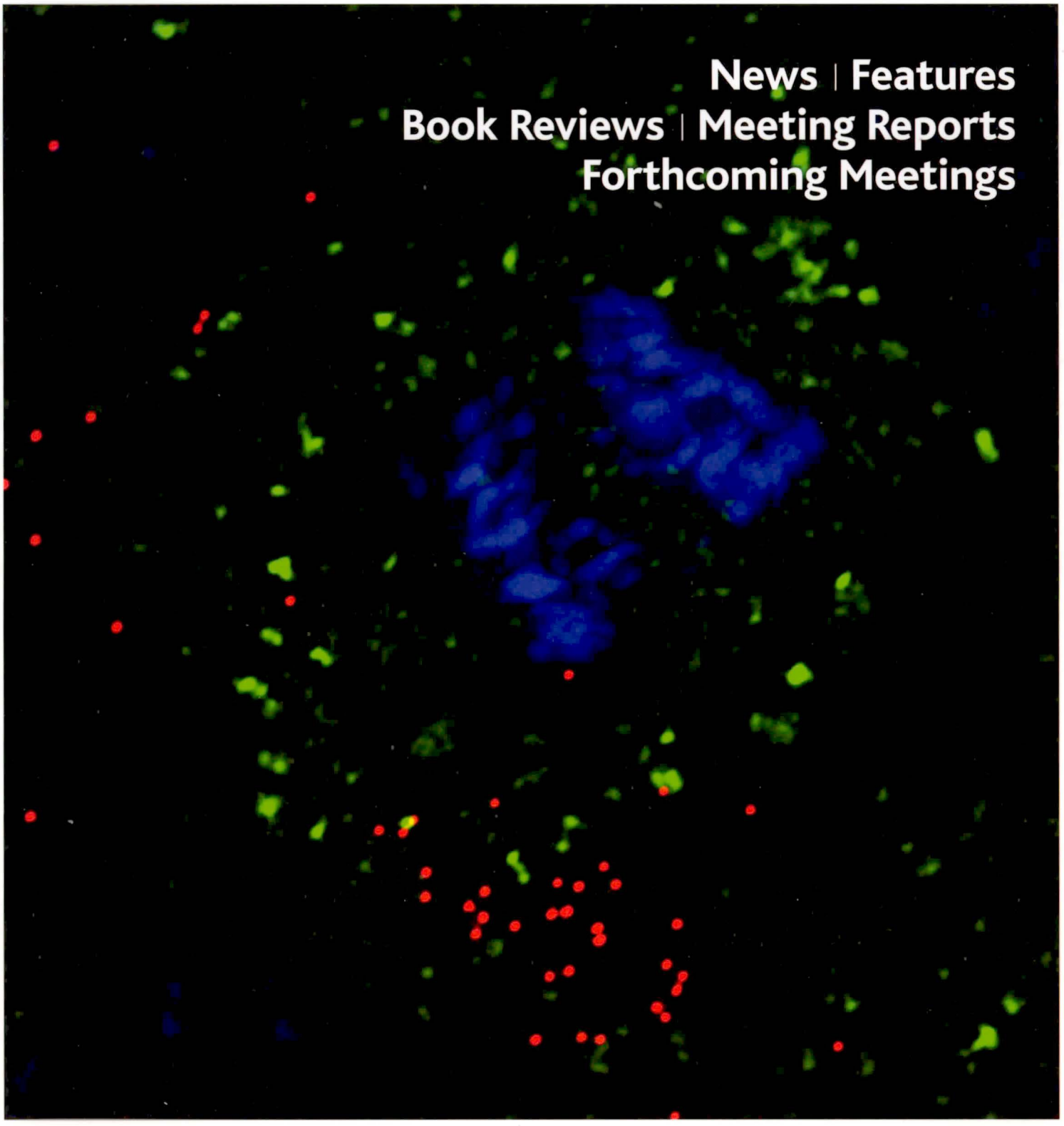
SPRING 2008

BSCB Newsletter

BRITISH SOCIETY FOR CELL BIOLOGY



News | Features
Book Reviews | Meeting Reports
Forthcoming Meetings

British Society for Cell Biology

B S C B

BSCB Autumn Meeting 2008

Epithelial Morphogenesis & Diseases

8th-10th September 2008

University of Greenwich - London- UK

Sessions

- Stem Cells
- Patterning
- Tissue specificity
- Morphogenesis
- Cell-cell adhesion
- Polarity
- Epithelial Diseases
- Epithelial Cancer

Honor Fell Travel Awards available - www.bscb.org

B S C B

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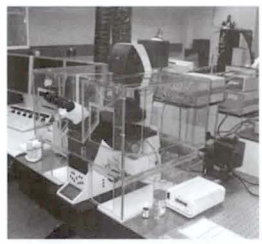


Editorial

Welcome to the first Spring issue of the BSCB newsletter. This should be arriving with you shortly after the end of the BSCB/BSDB Spring meeting at the University of Warwick. This follows another highly successful Abercrombie meeting in Oxford in September. This meeting is a great success in the UK cell biology calendar and looks set to continue with the next one being planned for 2012.

The 2008 autumn meeting is being organized by Vania Braga on the topic of 'Epithelial Morphogenesis and Diseases' and will be held at the University of Greenwich in the autumn. The next BSCB Spring meeting in 2009 will be held jointly with the Biochemical Society. Look out for more details on the societies' websites.

With the hectic meeting calendar it is always difficult to schedule meetings. A solution to this are a series of highly successful one-day meetings organized locally. The BSCB supports several of these meetings annually and they are a tremendously valuable addition to the bigger international meeting.

The BSCB is nothing without its membership. Please do remember that it is your society and that any member can provide input to the format of meetings events that should be occurring etc. The presence of postdoc reps on the committee, the ambassador scheme, and member services on the website, are aimed at providing multiple ways of getting involved.

The annual BSCB Spring meeting is perhaps the best chance for this and so we urge all members to think about making this a regular event on their calendars. While the Spring Meeting is often held with other societies (e.g. BSDB this year and Biochemical Society in 2009), this meeting is the best chance for cell biologists to gather, interact and indeed shape cell biology in the UK.

Please do provide any feedback on these newsletters to me directly and provide any suggestions you have for content. Also, if you have any great images for the cover then please do send them in.

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

The cover image shows a human keratinocyte loaded with red-fluorescent beads to study intracellular transport systems. DAPI staining of DNA (blue) shows the separation of sister chromosomes of the cell in anaphase. The green label shows a green fluorescent protein (GFP)-labelled marker protein of intracellular transport vesicles. A focus stack of images was taken on a Zeiss 200M epifluorescent microscope with a Hamamatsu Orca EM camera at 0.167μm intervals. The images were then deconvolved to remove out-of-focus light using MediaCybernetics Autoquant deconvolution with 30 iterations. Combination of maximum projections of each channel and contrast adjustments were then performed in Adobe Photoshop. The sample was prepared by Giulia Bollasco, image acquisition and processing was performed by Martin Spitaler.

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

News

Hooke Medal Winner 2008: Ben Nichols

The 2008 Hooke Medal was awarded to Ben Nichols of the MRC Laboratory of Molecular Biology in Cambridge.

Ben began his research career as a graduate student under the supervision of Dick Denton at the University of Bristol before undertaking highly productive postdoc positions with Hugh Pelham (at the LMB in Cambridge) and Jennifer Lippincott-Schwartz (at NIH in Bethesda).

Ben subsequently started his own lab in Cambridge and has made significant contributions to our understanding of clathrin-independent endocytosis, notably through characterization of the pathway defined by flotillin-1. His lab also studies the role of membrane dynamics in cytokinesis.

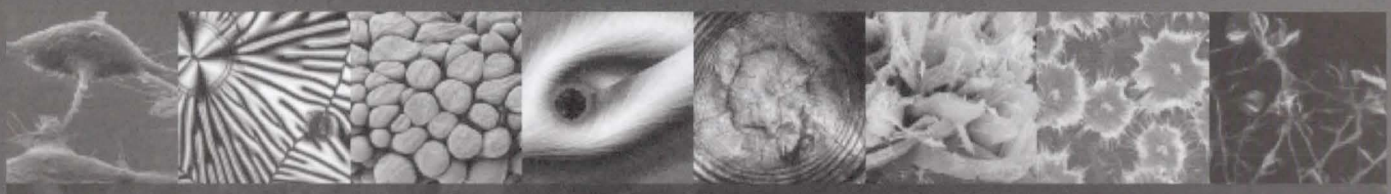
Ben's lab is renowned for the application of high resolution imaging techniques to the study of membrane organization and function, for example using fluorescence resonance energy transfer to probe protein oligomerization during T-cell activation. Ben has also been a member of the EMBO Young Investigator Programme.

The Hooke Medal is awarded annually by the BSCB committee to an emerging leader in cell biology who is normally within 10 years of starting their lab. The BSCB invites nominations for next year's Hooke Medal from any BSCB member and these should be sent, with a supporting statement (inc key pubs) outlining why the person nominated would be a suitable recipient of the Hooke medal and the name of seconder (can be any BSCB member), to the Secretary at any time. The medal, designed by Dr Brad Amos, shows Robert Hooke's microscope and the cork cells he first described.

RMS of interest to cell biologists

The RMS hosts **Microscience 2008** this summer. Microscience is the RMS biennial conference which includes one of the largest microscopy trade fairs in Europe. This is an excellent opportunity to talk direct to microscope manufacturers, hardware and software developers about all of your needs in light and electron microscopy.

The trade show is allied to a really excellent conference programme which this year includes a symposium titled "The Cell in Time and Space" and covers many of the key topics in cell imaging including object tracking, and new technologies such as PALM microscopy, Spatially Modulated Illumination(SMI) and tools for biodiagnostics. The excellent speaker list includes many names of great interest to the cell biology community, including Stefan Hell, Jason Swedlow, Rainer Pepperkok, Christien Merrifield and George Patterson. Further information can be found at www.microscience.org.uk. The conference runs across three days but single day passes are available. Please note that the early registration deadline is 18th April 2008!



See you there...

MICROSCIENCE 2008

www.microscience2008.org.uk RMS

INTERNA TIONAL CONFERENCE AND EXHIBITION

23 - 26 June 2008 ExCeL London

Schools News: Are you involved in outreach work in schools?

If 'yes' you will probably know that at the beginning of the new school year in September 2008 (Scotland excepted) new specifications for work in many A-level subjects will be introduced, including those for biology.

The various examination boards have different approaches to the guidelines set out by H.M. Government but it is interesting to see that some up-to-date approaches to cell biology have been included.

In the specifications produced by the Oxford, Cambridge and Royal Society of Arts (OCR) Board for example, the topics of cell signalling, programmed cell death (apoptosis), the total cell cycle and cloning and stem cells have been included. The inclusion of these topics is especially pleasing because in 2004 the BSCB Committee produced and circulated a document asking teachers of A-level biology to consider using 'big picture' terms such as 'signalling' when teaching about for example, hormonal and neuronal topics.

If you 'do Outreach' in schools please mention the BSCB Public Engagement site 'softCELL' and associated site 'CELLpics' to teachers and pupils. On the 'softCELL' site at www.bscb.org essays and can be located about many A-level topics in cell biology. More will be added by September 2008. 'CELLpics' at http://cellpics.cimr.cam.ac.uk displays images of cell organelles and are interpreted using the GridPoint moveable cross-hairs and zoom magnification devices. This site has been described as "fantastic" by Chris. Hawes, Professor of Plant Cell Biology and Microscopy, Oxford Brookes University and "great.....and will speak for itself" by Professor Jim Smith, Chairman of the Gurdon Institute, University of Cambridge. The free use of images used in these sites has been kindly allowed by their owners, or Wellcome Images, and is greatly appreciated.

More detailed information about the new specifications can be found (as at 6/1/08) at the websites of the following examination boards:

AQA: www.aqa.org.uk
Edexcel: edexcel.org.uk/home
OCR: http://www.ocr.org.uk

David Archer
BSCB Schools Liaison Officer

In brief...

BSCB-FUNDED MEETINGS:

Many other annual meetings take place through the year that receives contributory funding from the BSCB. Recent examples include several highly successful one-day meetings including the Northern Molecular Cell Biology organized in recent years by Liz Smythe (Sheffield) and now by Sylvie Urbé (Liverpool), Actin 2007 organized by Harry Mellor (Bristol) and Membrane Traffic UK organized by Dan Cutler (UCL). Each of these meetings is highly successful in its own right and showcases British Cell Biology. The focus on younger scientists and UK speakers makes them an ideal complement to the larger International meetings organized by BSCB.

FUNDING FOR LOCAL MEETINGS

The Society is prepared to provide limited financial support for meetings organized by any local interest group relevant to cell biology. Request for funds should be sent to the Treasurer, Mark Marsh, accompanied where possible by a report of a previous meeting. If a meeting receives support, a report from that meeting will be required for publication in the Newsletter.

BSCB MEMBERSHIP DATABASE

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

ARCHIVED NEWSLETTERS ONLINE

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

Light Microscopy at Imperial College London / South Kensington

The Facility for Imaging by Light Microscopy (FILM) at Imperial College London / South Kensington has been created to give scientists easy access to state-of-the-art light microscopy equipment. Comprehensive training and support in the facility allows users to concentrate on their scientific questions and solve them with the most advanced microscopic technologies.

In 2005, professors Tony Magee (Membrane Biology), Mike Ferenczi (Muscle Biophysics) and Dan Davis (Molecular Immunology) joined forces to complement their existing imaging equipment with new state-of-the-art microscopes. The new instruments were funded from a combination of sources; a BBSRC Systems Biology grant (CISBIC), SRIF3 money and College funds. Looking for the best way to make the most of the considerable investment, they decided to organise the microscopes in a managed facility and make them available to all scientists in the college.

With the employment of the new facility manager, Martin Spitaler (funded by the BBSRC CISBIC grant for 5 years), early in 2006 FILM started to take shape and come to life. After a phase of exhaustive user consultation and thorough testing, over £1 million was invested in new microscopes, including widefield, multiphoton, FLIM and high-speed confocals, based in purpose-modified rooms in the flagship Sir Alexander Fleming Building. At the same time, intensive user training was established and complementary equipment and data processing tools set up. Two years on, FILM is a vibrant place with an extraordinary variety of research projects being performed spanning a plethora of fields in life and other sciences.

Equipment available to researchers

The facility comprises a wide range of microscopes, from basic microscopy to special techniques using light to measure intracellular physiology or even manipulate fluorescent molecules.

Standard fluorescent microscopes allow direct observation of samples, either by transmitted light (phase contrast, differential interference contrast, histological staining) or using a wide range of fluorescent labels. Ultrasensitive cameras allow live imaging of biological samples with very low light, ensuring minimal phototoxicity over a long observation time (up to several days) or at very high speed (up to 200 frames per second).

Confocal microscopes use laser scanning technology to produce optical sectioning and three-dimensional reconstructions of fluorescent samples. This allows multi-dimensional reconstruction of biological structures in several colours, live and in real time. A fast resonant-scanner confocal in the facility also breaks the typical speed limit of confocal microscopy - with this system images can be acquired at up to 300 frames per second. The lasers also allow manipulation of fluorescent molecules to gather additional information, like dynamic properties revealed by recovery after photobleaching (FRAP) or movement of photo-activated fluorophores.

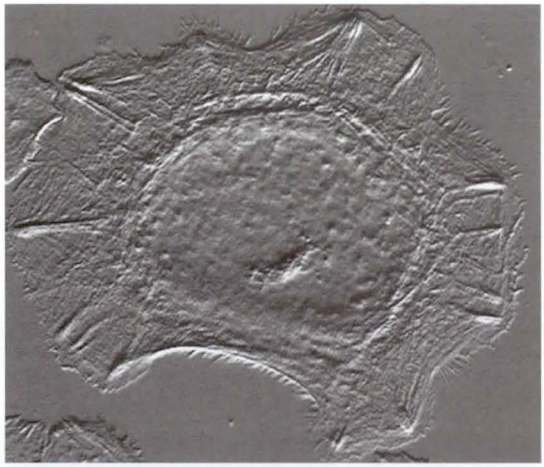
Whole new dimensions are opened up by the multiphoton confocal microscopes. Usage of infrared light for multiphoton excitation of fluorophores allows researchers to look inside living tissues and organs, with minimal disruption of physiological processes and with improved image contrast, reduced photodamage and penetration. At the same time, using a pulsed laser allows measurement of the time between excitation and emission of a fluorophore (the fluorescence lifetime). Because the fluorescence lifetime depends on the intracellular environment, this technology converts the fluorophore into a physiological sensor for parameters like pH, hydrophobicity (membrane binding), membrane order, Ca2+ waves, interaction with other proteins and others.

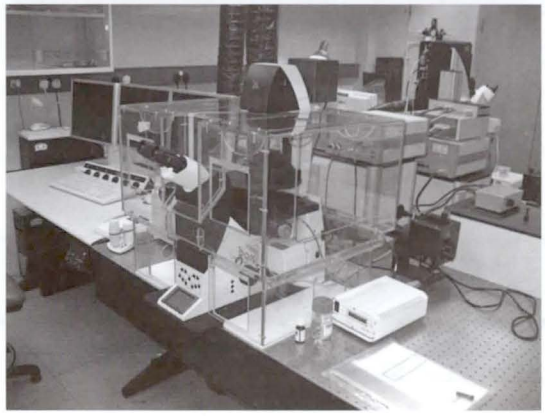
To guarantee optimal usage of the equipment for all aspects of research, the microscopes are complemented by additional equipment like environmental chambers, cell culture equipment, data storage space and computer analysis systems. Specialised software allows the sophisticated analysis of acquired data, like multidimensional particle tracking or ratiometric quantifications.

Support and services for researchers

To make sure researchers can concentrate on their scientific projects without worrying about technical problems, and to ensure acquisition of reliable scientific data, users get full support by facility staff (a new FILM technician has just been appointed) throughout their experiments. This includes individual hands-on training for users on each microscope, advice on experiment planning, introduction into new technologies relevant for their research, advice on image presentation and publication, help with grant applications, try-out samples for new tools and assistance with analysis software. The facility also acts as a hub for the huge variety of imaging expertise in the college, interacts with other facilities and works on the improvement of infrastructure like data transfer and storage.

At the same time, the facility is keen to respond to user demand and developments, from the upgrade of the existing microscopes to addition of entirely new technologies.





An important function is also in maximising the efficiency of research investments by streamlining expenses like service contracts and software purchases or access to existing equipment.

Research in the facility and outlook

Only two years into its existence, FILM has already developed into an extraordinarily vibrant place of research, with well over 40 projects being investigated by its over 150 trained users. Projects span virtually all aspects of life sciences, from mammalian cell biology to developmental biology, immunology, infection biology and malaria parasitology to botany and microbiology. Beyond life sciences, also a number of chemical engineers and even scientists from the Department of Mining have discovered the power of microscopic imaging for their own research.

In the future, the facility will have to keep up with the development of microscopy from personal observation to computer-aided extraction of biological data and large screening procedures. At the same time, it aims to be the place where exciting new technologies, some of them developed just across the campus in the Physics Department, can be applied to life sciences. These new techniques are pushing the boundaries of light microscopy towards molecular scales and into entirely new dimensions of information, showing life quite literally in a brand-new light. All following the facility's motto – "Observing life as it happens".

Martin Spitaler
Imperial College London

Stem cell pioneer awarded Nobel Prize

Sir Martin Evans is co-recipient of the 2007 Nobel Prize in Physiology or Medicine with Mario Capecchi and Oliver Smithies, for his pioneering work with mouse stem cells.

To understand the value of Martin's work, you have to consider that 30-40 years ago mainstream scientific opinion believed that creation of targeted gene disruption in mammals would be impossible and the existence of stem cells, in anything other than regenerating tissues such as blood and skin, was far from accepted. However, in plants things were clearly different, here it was possible to culture cells isolated from mature adult organisms, genetically manipulate them and then regenerate a complete transgenic plant. The importance of Martin's work is to establish the methods for this in mice.

Working initially with embryonic carcinoma (EC) cells, derived from mouse teratocarcinomas, he showed that these cells could be both differentiated in in vitro culture and to a large extent develop into adult tissue when mixed with normal embryonic cells. Technically, this however proved to be a dead-end as a route to regenerating complete mouse strains, and the major break though came in 1981 with the isolation and culture of embryonic stem (ES) cells from normal mouse embryos. Unlike the tumour derived EC cells, ES cells could be both cultured in vitro and used to create fully fertile mice for breeding. In parallel, Mario Capecchi and Oliver Smithies had devised methods for exploiting mitotic homologous recombination to target gene disruption in cultured mammalian cells. Combining these techniques with ES cell culture provides the means for the knockout mouse technology that forms the basis for modern mouse genetics. Although still not trivial, creating knockout mice is at least routine. Although this is a major technical achievement, a greater scientific legacy may arise from Martin's pioneering work with "stem" cell cultures, as the concept that cells can be isolated, maintained in culture and differentiated by controlling factor in their growth medium lies at the foundations of our current stem cell science.

Martin graduated from Cambridge and carried out his PhD studies at University College London, where he continued as a lecturer. He returned to Cambridge in 1978 to the Dept of Genetics. In 1999, he was appointed Professor of Mammalian Genetics and Director of the School of Biosciences at Cardiff University. Under his Directorship, the School has developed extensive expertise and research activity in stem cell research and mouse genetics, fitting well with its strong research activities in molecular cell biology, developmental biology, regenerative medicine and neuroscience. Martin was elected a Fellow of the Royal Society in 1993; awarded the Lasker Prize in 2001 with Mario Capecchi and Oliver Smithies and was knighted in 2004 for his services to medical sciences.

To read more about Martin's current work and that of his Cardiff colleagues, see www.cf.ac.uk/biosi/research/index.html

Adrian Harwood
University of Cardiff

LabLit.com: the culture of science in fiction and fact

Can we learn anything about our culture from the stories we read?

An alien anthropologist, armed with only our weekly fiction best-seller lists, might well conclude that our most populous and revered profession is that of the police detective inspector. But he could easily peruse new novels for months and never work out that our species actually performs scientific research or thinks about scientific ideas. This same alien might be a bit confused if given access to the Earth's daily media outlets, where scientific news is cutting-edge and plentiful. So science is everywhere, but its practitioners are largely absent in the world of our imagination. This is a puzzling discrepancy, especially given that there are many more scientific researchers than detectives on this planet. Put another way, if fiction is a mirror held up to our culture, then scientists are surely its vampires – they lurk around in the shadows but cast no reflection.

Our alien might, of course, run across a fair bit of science fiction in his study of Earth's bookshops, but while reading this genre might teach him something of the speculative fears and aspirations of our species, little would be gleaned about the realities of day-to-day scientific research life or practice. General literary fiction about scientists, or 'lab lit', on the other hand, is extremely rare, with new examples emerging only once every few years, if that. If you think I'm exaggerating, try to name more than three trade-fiction novels that contain scientists as central characters, ideally set in an actual lab or research field station, written in any era of history including the present. I do this frequently as a party trick, and many people struggle to name even one. (There are, in fact, about seventy examples that I'm aware of; even if this is undoubtedly an underestimate, it's not terribly far off.)

One of my life's passions is trying to increase the awareness of the scientific profession in general, and lab lit fiction in particular, so that more stories about scientists will be written, published, read and made into films. Why? Quite simply, the lab is an underutilized treasure-trove of ideas, images, themes and human passions, all there to be exploited by writers who'd like to try something different for a change. More seriously, people fear and distrust what they don't understand, and fiction is an excellent way to cast light on an unknown world in a very subversive way. To most, the lab is a threatening setting shrouded in mystery, and its cast of characters, cavalier or arrogant people who are at risk of losing control of the power they wield. Scientists may not think they need society's approval, but society is what holds the purse strings and the regulatory lenience to allow them to practice. Ignore its approval at your peril.

This spring, LabLit.com will be three years old. LabLit (http://www.lablit.com) is a non-profit, online magazine devoted to illuminating the scientific world and promoting its appearance in popular culture and fiction (not only novels but short stories, plays, film, and television dramas, and the occasional poem). The site is a venue for scientists and non-scientists alike which – in an era of various worthy and earnest outputs for 'science culture' and 'sci-art' – strives for a more light-hearted tone. Scientists are given a podium to share their serious or humorous observations about lab life, with essays ranging from what it's like to research in extreme sites such as Antarctica or atop Mauna Kea, to the joys of dashing away from a bar in full party gear to feed your bacteria at 3 a.m. Non-scientists, including writers and artists, can share their perspective on science from the outside, and the two camps can also meet and exchange informal ideas in our discussion forums. The format is diverse: in addition to essays, we also feature art, parody, cartoons, reviews, and interviews with movers and shakers. One enterprising post-doc recently submitted a sculpture of an angst-ridden figure plastered in bits of scientific articles being dragged under by electrophoresis leads.

The promotion of lab lit fiction is, of course, a major focus of the site. First and foremost, we offer a dedicated platform for original lab lit fiction, whether it be short stories or serialized novels and plays. We also curate The List, which is an attempt to document all lab lit novels, plays, films and television dramas ever written. And finally, we offer a voice to writers who want to share their experiences (whether successful or not) in how to get lab lit published in an industry guarded by arts and humanities graduates who usually have little interest in science. In the future, LabLit.com plans to facilitate getting more science into literature by sponsoring a print-on-demand virtual imprint to bring together quality lab lit authors who have been unable to secure a publishing deal by more traditional methods.

LabLit.com is always looking for new voices from scientists of all ages and descriptions, so if you want to know more, just contact us via the site.

Dr Jennifer Rohn is Wellcome Trust fellow at the MRC Laboratory for Molecular Cell Biology at University College London, as well as a freelance science writer and the founder and editor of LabLit.com. She was recently elected a Fellow of the Royal Society of Art for her work promoting the image of scientists in popular culture.

The Lab Coat Liberation Front

On a recent Saturday morning, I had an out-of-body experience. I opened *The Times* to discover, on the front of the section called Body and Soul, a photograph of me. Except, it wasn't. It was my head. But to my surprise, my head wasn't attached to my body. It was attached to someone else's, rather smaller, body. This created a very odd effect. But what really caught my eye was that the body was doing something I don't do. It was wearing a lab coat.

The reason my head was in the paper at all was my involvement with Animal Farm, a new documentary television series for Channel 4; the series was a survey of biotechnology, from genetically modified food to sheep with partly human organs. Giles Coren, restaurant critic and the new face of Bird's Eye, and I were presenting it. Giles supposedly represented the ordinary person; I supposedly represented the voice of science.

When I agreed to be interviewed by *The Times*, I was asked if I'd pose for some photographs. I wrote back, and said sure – but the one thing I wouldn't do was pose in a lab coat. I naturally did not expect that my refusal would result in my head being spliced onto a lab coat anyway.

The Times later apologised to me – though they did not print either the apology or my letter to the editor – and assured me that it's not their policy to doctor photographs and pass them off as the real thing. Quite.

But there's another point here. The doctoring of the photo typifies what's wrong with the way science is often portrayed in the media. It's more than fifteen years since I did the sort of experiment that would need a lab coat—and (halcyon days!) we didn't bother to wear them then. Nowadays, like many of my colleagues, I do my research sitting in front of a computer. To show me – or them – wearing a lab coat is thus to show something bogus. (In the series, I wear a lab coat where health and safety required it; so does Giles.) Yet the editors of *The Times* seem to feel that to show a scientist, they have to show a lab coat. It's as absurd as saying that to show a Muslim woman, you have to show a veil.

Of course, *The Times* is hardly unique in its lab-coat fetish. Mark Miodownik, a materials scientist at Kings College London, recently had a lab-coat spat with a television company. He refused to wear one because he doesn't in his work. hey refused to film. The eventual, ludicrous compromise was that one of Mark's colleagues put on a lab coat for the opening shots – and then immediately took it off. But as far as the television company was concerned, a science programme had to include a lab coat regardless of the coat's relation to reality.

Well, so what? Lab coat, drab coat: surely it's a trivial form of stereotyping. Why make a fuss? After all, some scientists do wear lab coats in order to keep their clothes clean while in the laboratory (nowadays health and safety regulations require them), just as some cooks wear aprons. So I asked Mark why he cared. He said, "I wanted to appear as myself—an ordinary person. Not caricatured as some mad scientist, a weird brainiac, dressed in white with strange explosions going on in the background. Science is an important part of our culture – one of the best parts – and scientists should be seen as they actually are, not as actors in costume."

Hear, hear! Fear of science – from anxiety about vaccinations to hysteria over cloning and genetically modified food—pervades British society. Because of the split education system, most people here gave up science at 16, and have little real idea who scientists are or what they do. Sad to say, the (un)popular image of scientists is arrogant people in white coats doing sinister things in creepy laboratories. A reader of The Daily Mail could be forgiven for thinking that the world is infested with latter-day Dr Frankensteins—after all, these days Frankenstein is one of the words most commonly used in articles about biology. And when was the last time you saw a movie that had a scientist as the good guy? They're usually busy wrecking the world. Showing scientists in lab coats helps perpetuate a sense of alienation between scientists and the general public.

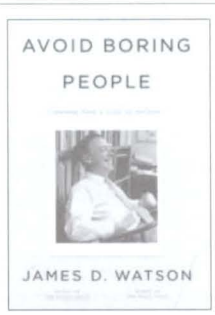
So, what to do? One friend helpfully suggested I "take off the lab coat" for *The Sun*'s page 3. Another has instigated a lab-coat rebellion at her institute: henceforth, no one is to be photographed in one. Women burned their bras in the 1960s to protest against men looking at them as objects instead of as people. Perhaps it's time for scientists to take their lab coats and a box of matches outside, and do the same.

Olivia Judson is a research fellow at Imperial College London. A version of this article first appeared in *Prospect* magazine.

Book Reviews

Avoid Boring People (and other lessons from a life in science)

JAMES D. WATSON



Avoid Boring People (and other lessons from a life in science.)
James D. Watson.
Oxford University Press.
347 pages
ISBN 978-00-19-280273-6

Scientific autobiographies tend to have rather similar trajectories. They begin with the hero discovering the charms of science in childhood or youth, gather pace as he or she embarks on the work that will bring renown, and crest with the tension and triumph of major discovery and perhaps even a Nobel. All that invariably makes for a gripping read. It's the rest that tends to be rather dull: the list of talks given, prizes won, countries visited, institutes directed, committees chaired, petitions signed and so on interminably to the edge of the grave.

Jim Watson has done all this and more. And there's no doubt that his latest book, *Avoid Boring People*, covers plenty of potentially dull material for his triumph and his Nobel came when he was still so young. Yet Watson, idiosyncratic as always, has invented a new form of literature: the scientific autobiography as morality play. Here, we are told, is how I did it when I was an undergraduate in Chicago, post grad in Indiana, postdoc at the Cavendish, assistant professor at Harvard, and the Director of Cold Spring Harbour Laboratories – and here are some lessons that I learnt along the way.

The lessons themselves vary in nature. Some seem self-justifying ("Stay in close contact with your intellectual competitors."), while others are more rueful in tone ("Humility pays off during oral exams."). A few are rather specialized ("Expect to put on weight after Stockholm."). Others are plain common sense ("Don't play golf."). A book about Harvard departmental politics or running CSHL was never going to be as gripping as The Double Helix, yet the charm and insight that Watson brings to his morality play make this book essential reading no matter where you are on the academic ladder. It's a book to give away: give one to your science-mad niece ("Don't be flippant to teachers."); better yet, give one to your Head of Department ("Promote key scientists faster than they expect.")

Avoid Boring People isn't the whole of the Watson story. In fact, it only takes it up to 1976 when he resigned from Harvard; the Human Genome is yet to come. Will it? I hope so, but fear not. Watson is soon 80, and though his intellect remains sparkling and his literary powers undiminished, the publication of this book was, for him, a miserable affair overshadowed by the hue and cry raised over some incautious remarks made to a journalist about race. Yet there are plenty of useful lessons that he can still teach us, lessons that are the result of hard-won experience. Here's one: "Never talk to the *Sunday Times*."

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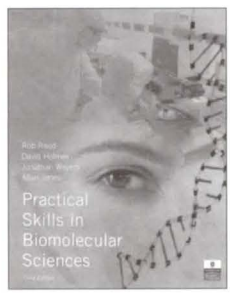
Imperial College London, SL5 7PY; a.leroi@imperial.ac.uk

Practical Skills in Biomolecular Sciences

ROB REED, DAVID HOLMES, JONATHAN WEYERS AND ALLAN JONES.



Practical Skills in Biomolecular Sciences
Rob Reed, David Holmes, Jonathan Weyers and Allan Jones.
Third Edition, 2007
xv + 552 pages
Pearson Education Limited, Essex, UK
ISBN 978-0-13-239115-3

A recent article entitled *The Future is Interdisciplinary*, although written in a field remote from biomedical sciences[1], underscores unity, convergence, synthesis, complex questions, and broad issues as some of the advantages linked to interdisciplinarity. This is true of many disciplines and the biomedical sciences are no exception.

The interdisciplinary nature of science requires an increasingly broad knowledge across a variety of topics. To provide just one example, the emerging field of bioinformatics is situated at the convergence of several disciplines, including medicine, physics, mathematics, biochemistry and computer sciences. We have reached the time when new fields, such as genomics, proteomics, transcriptomics and metabolomics, promise to change the face of science in ways that decades ago seemed unthinkable.

Practical Skills in Biomolecular Sciences, now in its third edition, is an indispensable resource for anyone considering a career in biomedical sciences. With 67 chapters organized into 10 sections, the book covers a vast collection of topics. It starts with a description of transferable skills, such as working with others, taking notes, managing one's time, preparing a resumé, organizing a scientific presentation, preparing a poster, or acquiring and developing scientific writing skills. The introductory sections also address information technology and offer guidance on how best to use online libraries and databases.

The book provides a set of fundamental concepts from biological, chemical and physical sciences. The sections that describe laboratory techniques, such as preparing solutions, measuring pH, the use of a microscope, or sterile microbial and tissue culture skills are essential for anyone considering any of the biomedical disciplines. One section is dedicated to analytical techniques, such as immunological methods, centrifugation, spectroscopy, chromatography and electrophoresis, while another part of the book focuses on molecular genetics and bacterial, phage and Mendelian genetics concepts. The concluding section provides valuable insights into analysing data, organizing graphs, or choosing and employing statistical tests.

The third edition of *Practical Skills on Biomolecular Sciences* brings important changes. The text is updated with information on bioinformatics, discussions on how to avoid plagiarism and copyright infringement, aspects of e-learning and bioethics, and introductions to ELISA and DNA microarrays. In every chapter, boxes illustrate some of the most noteworthy concepts, such as procedures for calculating molar concentrations; the basics of the polymerase chain reaction; how graphs can misrepresent or mislead; the use of a counting chamber; or conversions of mass, weight, area or length units. Each chapter is followed by study exercises.

In an easy-to-read and well-organized format, the book provides the basic concepts that will benefit a broad group of undergraduates contemplating a career in biomedical sciences. Above all, one of its great achievements is the breadth of practical teachings that students need to employ on a daily basis but usually will not find in most textbooks.

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Bioinformatics

EDITED BY PAUL H. DEAR

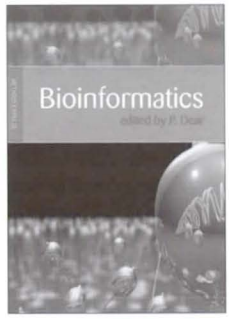
We recently marked the 30th anniversary of modern DNA sequencing[1]. The first genome sequence, completed in 1977, was that of the 5,375-nucleotide bacteriophage ϕX174[2]. The amount of DNA sequenced has seen, between 1965 and 2005, a logarithmic increase exceeding nine orders of magnitude, corresponding to a doubling time of about 16 months[3].

Making sense of this vast amount of information would not have been possible without the advent of the -omics disciplines in a new framework based on, and assisted by, computational biology. The increasing volume of information has revolutionized the biomedical world and posed substantial challenges for researchers, particularly for investigators lacking a solid background in computational biology. As a recent article noted, 'it does not take a crystal ball to predict that bioinformatics will be woven inextricably into the fabric of life science in the 21st century'[4].

Bioinformatics targets mostly this very group of scientists, the non-bioinformaticians, and provides easy-to-understand concepts that increasingly promise to become part of scientists' lives, irrespective of their current field, past background or future directions. The 12 chapters overview fundamental topics in the field, such as database searches, genome annotation tools, gene predictions, similarity searches, identification of regulatory elements and prediction of regulatory sequences, multiple sequence alignments, protein structure and function prediction tools. Each chapter, authored by recognized experts in the field, provides protocols accompanied by easy-to-understand instructions that clearly illustrate how to use a specific program, piece of software or database, along with descriptions of limitations and difficulties, and troubleshooting aspects.

The text provides references to the most relevant and recent publications. Moreover, many chapters are accompanied by collections of web sites that are of great assistance for the readership. Examples include web resources for genome sequences, bioinformatics sites, genome annotation tools, software facilitating the search for non-protein coding genes, or servers used for sequence and sequence comparison analysis.

The book represents an excellent bioinformatics resource for non-bioinformaticians. It describes the most important concepts and paves the way for those who require more comprehensive texts. Above all, it vividly illustrates how bioinformatics is becoming indispensable in comprehending the massive amount of information recently accumulated in various fields, in a way reminiscent of the words that Erwin Schrödinger expressed over half a century ago in his masterpiece "What is Life?": 'we are only now beginning to acquire reliable material for welding together the sum total of all that is known into a whole'.



Bioinformatics
Edited by Paul H. Dear
Scion Publishing Ltd., 2007
xxxi + 294 pages
ISBN: 978-1-90484-16-3

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Richard A. Stein (see above)

Molecular Biology of the Cell, 5th Edition

ALBERTS, JOHNSON, LEWIS, RAFF, ROBERTS AND WALTER.

This is of course an astonishingly hard text book to review. Quite simply, this is the fifth edition of a seminal text for cell biology courses worldwide. It builds on previous additions by including more information, additional diagrams and interactive material.

The striking red cover (with requisite Beatles-style picture of contributors on the back – this time *Revolver*-style – comes in two editions, the reference edition (ISBN 978-0-8153-4111-6) includes additional printed chapters on multicellular systems (sexual reproduction, development, specialized tissues and stem cells, pathogens and innate immunity, and finally adaptive immunity); in the student edition, these chapters are present as PDF files on the accompanying interactive DVD-ROM. This is designed to make the student edition more portable (even though it still runs to over 1300 pages!).

Apparently in response to feedback, each chapter now also contains its own mini-problems section at the end. This is clearly of great benefit to students as they can get an immediate idea of their comprehension. In addition, one can also buy the accompanying problems book written by Wilson and Hunt. This provides more in-depth questions and is an excellent study resource in its own right. New additions include RNA interference, and new cancer therapies; apoptosis now gets a chapter of its own.

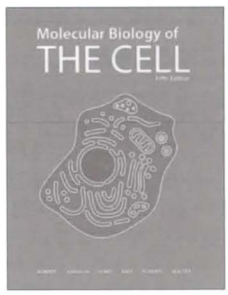
Picking a few sections based on my own teaching, the chapter on cell imaging is greatly expanded, with updated sections on fluorescence microscopy including photobleaching and photoactivation through to detail of total internal reflection fluorescence imaging and atomic force microscopy. There are good new additions to that on membrane trafficking such as the inclusion of retromer function, revised sections on vesicle coat formation and membrane domain organization. Much of the material is taken from the earlier version of the book but since that was in itself such a good text, why not! New material in the section on the cytoskeleton adds considerable clarity as well as new material on motor protein mechanism.

The accompanying DVD-ROM contains all of the figures, tables and micrographs from the book in both PowerPoint and JPEG formats as well as over 130 movies of animations, videos and molecular models. The ready-to-go PowerPoint slides of every figure from the book make this ideal resource for lecturers. The DVD was compiled under the scientific and artistic direction of Peter Walter and the movies are narrated by Julie Theriot and this is an excellent resource in its own right.

I have always enjoyed this book since using the second edition as an undergraduate. This new edition is well worth the investment both in purchasing and dedicating time for reading. I would very strongly recommend this text to anyone who is embarking on a degree course in Cell Biology, Biochemistry, Biomedical Life Sciences, Forensic Molecular Cell Biophysics or any of the multiple degree variants that are essentially all "Molecular Biology of the Cell" now in existence. With the turnaround time for new editions (seemingly about 5 years), those starting their courses in 2008-09 are likely to benefit from this book throughout their degrees.

In summary, this is an outstanding textbook providing comprehensive coverage of the field. Notably thought, this is a text that I would recommend be readily accessible for graduate students, postdocs and even senior research staff. Its breadth of coverage makes for a very simply starting point for any new aspect of cell biology that one encounters in these interdisciplinary times.

David Stephens, University of Bristol



Molecular Biology of the Cell, 5th Edition.
Alberts, Johnson, Lewis, Raff, Roberts and Walter.
Published by Garland Science, Taylor and Francis Group.
ISBN 978-0-8153-4105-5 (hardcover); 978-0-8153-4106-2 (paperback)

DNA topology

ANDREW D. BATES AND ANTHONY MAXWELL

Everyone is familiar with the elegant double helix of DNA, but do you know why the two complementary strands twist around one another? Or have you ever thought about the consequences of manipulating a helical structure during essential processes such as DNA replication and translation?

DNA has been known to exist in a variety of forms and higher order structures for over 50 years and it is well established that many of these structures play essential roles during a wide range of biological processes. Despite this, the importance of DNA topology is perhaps sometimes overlooked when studying DNA protein interactions. This may in part be due to the potentially confusing terminology and the somewhat abstract concepts involved. As more and more advances are made, however, particularly in eukaryotic systems, it is becoming clear that an understanding of the principles of DNA topology will be essential in the dissection of many molecular mechanisms involving DNA.

DNA Topology is a comprehensive introduction to higher order structures of DNA, such as supercoiling, knots and catenanes, and aims to provide a bridge between simplified textbook explanations and complicated specialised works on the subject.

The first chapter deals with basic DNA structure and the different forms of DNA from B, A and Z-form DNA to cruciforms, quadruplexes and triple helices. Here you can begin to see that rather than just a "passive repository of genetic information", DNA is a molecule with fascinating innate biophysical properties.

I remember a friend at University resorting to cutting through his telephone wire the night before biochemistry finals. Not to provide uninterrupted last minute revision time, but because a telephone wire is in fact an ideal model for demonstrating one of the properties of DNA supercoiling. It is therefore worth trying out the physical demonstrations suggested throughout the book, as they are invaluable for a sound understanding of DNA supercoiling.

Imagine twisting the ends of a piece of string until it suddenly flips into an inter-wound loop. This happens because the string finds it easier to distribute the twist you have introduced by converting it to a winding through space around itself. It is exactly the same case for DNA; twisting of the double helix results in the formation of a higher order coil—a supercoil. Untwisting results in negative supercoiling and over-twisting in positive supercoiling. Chapter two explains the language, quantitation, geometry and thermodynamics of supercoiling. The effect of solution conditions on the conformation and energetics of DNA supercoiling, the theoretical basis of bending and twisting DNA and computer simulations of supercoiled DNA are all areas with recent advances covered in *DNA Topology*.

After reading in the preface that the authors had at one point been advised to "invite readers to simply staple together the pages of chapter three" which deals with DNA on surfaces, I wasn't sure what to expect! It certainly describes some quite abstract ideas; however, they are explained clearly and are worth getting to grips with as the main application of these concepts relates to the wrapping of DNA around histones, a key consideration for processes involving eukaryotic genomes.

Very soon after the structure of DNA was discovered, it was realised that there was a problem. During DNA replication the two strands of the double helix must be pulled apart, and it was reasoned that this would result in the DNA either side of the replication site becoming over-twisted. We now know this is indeed the case and that this over-twisting is manifest in supercoiling, which is 'neutralised' by specialised enzymes. These enzymes, known as topoisomerases, can catalyse the removal or introduction of supercoils into DNA. Their description in this edition of *DNA Topology* is enhanced by the inclusion of several examples of recent crystal structures which have greatly advanced understanding of the mechanism of action of these enzymes.

The last chapter discusses several biological processes which illustrate the importance of DNA supercoiling in vivo. More and more examples of this are revealed as we understand more about processes such as gene regulation and transcription, especially in eukaryotic systems, and this section helps to put the theory of DNA supercoiling learnt from earlier chapters into biological context.

DNA topology is written in a friendly style and with the appreciation that some of the concepts described are not necessarily intuitive. The authors provide good analogies and simple 'experiments' to perform with paper or tubing to reinforce the diagrams in the book. The companion website also contains some supplementary 3-D figures and animations (including "Why is DNA a helix?") in addition to further useful links and information. Finally, there is a handy conclusion at the end of each chapter, which may be especially useful in the case of chapter three!

The original version of *DNA Topology* is a staple in many labs, so it's great to see a new updated version. I would recommend it to any biologists interested in DNA-related processes, and make one suggestion to Oxford University Press; sell this book with a complementary (and complimentary) section of rubber tubing, to save University telephone wires!!

Sarah McClelland, Marie Curie Research Institute
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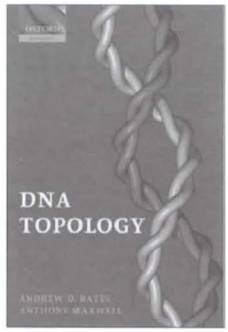

DNA topology
Andrew D. Bates and Anthony Maxwell
Oxford University Press

Books for review

Human Embryonic Stem Cells: The Practical Handbook
Sullivan, Cowan & Eggan, Wiley

RNA and DNA Editing: Molecular Mechanisms and Their Integration into Biological Systems Harold C. Smith (Editor), Wiley

The Biology of Extracellular Molecular Chaperones
Novartis Foundation, Wiley

A Cell Biologist's Guide to Modeling and Bioinformatics
Raquell M. Holmes, Wiley

The Abdominal Aortic Aneurysm: Genetics, Pathophysiology and Molecular Biology Tilson, Kuivaniemi, Upchurch; Annals of the New York Academy of Sciences

Whole Genome Amplification: Methods Express Hughes & Lasken, Scion Publishing

DNA Microarrays: Methods Express Schena, Scion Publishing

Immunohistochemistry: Methods Express Renshaw, Scion Publishing

Proteomics: Methods Express O'Connor, Scion Publishing

A Textbook of Neuroanatomy Patestas and Gartner, Blackwell

Skeletal Development and Remodelling in Health, Disease and Aging
Zaidi, Annals of the New York Academy of Sciences

Meeting Reports

BSCB 2007 Autumn Meeting 6th Abercrombie Meeting on Cell Migration: from Molecules to Organisms

9–12 September 2007. St Catherine's College, Oxford.

The serene spaces created by the minimalist architect Arne Jacobsen at St Catherine's College, Oxford, offered the perfect setting for reflecting upon the beauty of motile cells. Such beauty was wonderfully captured by Michael Abercrombie (FRS) in the 1950s and has been the topic of the Abercrombie meetings held every 5 years since the death of Michael Abercrombie in 1979.

The British Society for Cell Biology's 2007 Autumn Meeting, held jointly with the Royal Microscopical Society, was the 6th Abercrombie Meeting on "Cell Migration: from Molecules to Organisms". The meeting organisers (Anne Ridley, Randall Institute, King's College, London; Michelle Peckham, University of Leeds; and Peter Clark, Imperial College, London) ingeniously decided to invite Joan Heaysman, a long time collaborator of Michael Abercrombie. Joan's warm presence and obvious fascination for the subject made the meeting all the more touching and inspiring.

The conference started with a sumptuous welcome dinner, followed by a thought provoking keynote lecture given by **Gary Borisy** (MBL Woods Hole, USA). Work from Gary Borisy's laboratory has often beautifully shown that the actin filaments at the leading edge of motile cells are organised in characteristic branched arrays. On this Sunday evening, Gary Borisy discussed the genesis of this self-organising supramolecular ensemble. In particular, can this seemingly "intelligently-designed" intracellular architecture be generated through natural selection? Gary Borisy described a recent computer model based on the dendritic-nucleation/array-treadmilling conceptual framework which encapsulates our current understanding of how lamellipodial actin is generated. We were entertained by computer generated images of dynamic actin networks which spontaneously self-organise to form the familiar dendritic arrays. In true Darwinian fashion, Gary Borisy concluded that "the propulsive actin network can be understood as a self-organising supramolecular ensemble shaped by the evolution of dendritic lineages through natural selection of their orientation". A lively and enlightening discussion followed, which no doubt ended late in the bar.

The lamellipodium returned to the agenda on Monday, when **Vic Small** (Institute of Molecular Biotechnology, Vienna, Austria) presented negative stain electron microscopy and cryo-electron microscopy data suggesting that lamellipodial actin is not branched at a constant 70° angle after all – so the jury is still out. **Graham Dunn** (King's College, London) who worked with Michael Abercrombie in the mid-70s, gave an accomplished and highly informative overview of the live cell imaging methods he developed with Daniel Soong. G-actin dynamics in the lamelliopdium of migratory cells measured using FLAP (fluorescence localisation after photobleaching) suggest that the flow of actin towards the protruding zones may involve active transport. This raises the interesting questions of what mediates this active transport, and whether or how this transport is affected by retrograde flow and/or the direction of migration. The potential role of hydrostatic pressure was mentioned, as it was many times throughout the meeting, highlighting the fact

Joan Heaysman and Adam Middleton

that the role of hydrostatic pressure in protrusion formation and motility is probably understudied.

Apart from the lamellipodium, other actin-rich structures also received interest. **Jan Faix** (Hannover Medical School, Germany) talked about the molecular mechanisms of filopodia formation and how filopodium formation can occur in the absence of lamellipodia. Jan Faix's talk was beautifully illustrated by striking images of *Dictyostelium* overexpressing the Diaphanous-related formin dDia2. **Pekka Lappailanen** (University of Helsinki, Finland) described how live cell microscopy revealed the hidden dynamics of the contractile actin structures found in muscle (sarcomeres) and non-muscle cells (stress fibres). **Louise Cramer** (University College London) presented work on the parallel actin bundles seen at the base of migratory cells. Interestingly, these bundles assemble just before the break in cell symmetry and cell polarisation. Cell migration ensues in the direction of the long axis of these bundles but is inhibited when formation of these oriented bundles is blocked. Finally, **Gareth Jones** (King's College, London) made sure podosomes were not forgotten and gave an overview of these fascinating structures.

True to its title, "From Molecules to Organisms", the meeting covered all scales of investigation. At one end of the spectrum, **Marie-France Carlier** (CNRS, Gif-sur-Yvette, France) described an impressive array of biochemical assays that have highlighted the subtle differences and functional versatility of the WH2 domains found in the actin binding proteins β-Thymosin, Ciboulot, N-WASP and Spire. **Batiste Boeda** (Cancer Research UK, London) gave a beautiful presentation of his work on Tes, a novel regulator of Mena and the first regulator specific to a single Ena/Vasp family member. **Erik Sahai** (Cancer Research UK, London) quickly introduced his *in vivo* imaging model but focussed on the opposing roles of RhoE and PDK1 in relation to their regulation of ROCK1 activity. A high-throughput screen identified PDK1 as a regulator of cell morphology. Further work showed that PDK1 interacts with ROCK1 and is required for ROCK1-induced contractility.

At the other end of the spectrum, the organisms described included *Dictyostelium*, *Drosophila*, zebrafish and mice models. **Carole Parent** (NIH, Bethesda, USA) showed memorable movies illustrating streaming and signal relay in *Dictyostelium*, and presented elegant experiments highlighting the importance of CRAC, PI3K and adenylyl cyclase for chemotaxis. Collective cell migration was also discussed by **Peter Friedl** (University of Wurzburg, Germany). Histopathological sections of different cancers show quite diverse invasion patterns, ranging from disseminated individual cells to complex collective invasion strands and Peter Friedl wanted to address this issue by studying cells migrating in 3D collagen gels and *in vivo*. Stunning images illustrated the plasticity of cell migration and its effects on extracellular matrix (ECM) patterning. Collective invasion or single-cell mesenchymal migration both depend on proteases and result in macro- and micro-remodelling of the ECM respectively. Upon protease inhibition however, cells migrate individually in an amoeboid fashion without inducing any ECM remodelling.

The poster sessions took place in the evening, close to the bar serving free drinks! This was obviously conducive to stimulating scientific discussions and it was wonderful to hear Joan Heaysman commenting on the fact that Michael Abercrombie would have very much approved of such an arrangement. Joan was also delighted to see that there was a resurgent interest in the relatively under-studied phenomenon of contact inhibition, first described by Michael Abercrombie.

The third day explored a variety of subjects, ranging from the mechanism of membrane blebbing (**Guillaume Charras**, University College London) to the regulation of microtubule outgrowth by Memo, a protein implicated in mediating breast cancer cell motility (**Ali Badache**, Centre de Recherché en Cancerologie de Marseille, France). This session also highlighted the importance of myosins in cell migration. **Margaret Titus** (University of Minnesota, USA) showed how talinA and myosin 7 interact in *Dictyostelium*, and their

involvement in cell-surface adhesion and phagocytosis. **Michelle Peckham** (University of Leeds) demonstrated the distinct functions of non-muscle myosin 2A and 2B in myoblast migration and fusion. **Michael Sheetz** (University of Columbia, USA) exploited the properties of matrix surfaces in understanding cell behaviour and morphology in response to mechanical signals. He demonstrated that cells plated onto a soft surface are unable to spread, whereas on a rigid surface they spread but fail to form ruffles. Further analysis revealed Cas, a member of the Src family kinases, as a biochemical candidate for sensing mechanical signals. The stimulation of Cas, led to the force-dependent activation of the small GTPase Rap1, in which cytoskeletal complexes also played a vital role. Indeed, the dynamic remodelling and reorganisation of the actin cytoskeleton is a key factor in the ability of cells to respond to mechanical signals. **Karen McGee** (University College London) explained how MAL, a co-activator of SRF transcription factor, is regulated in its localisation and activity by monomeric actin. The levels of this actin-dependent MAL were shown to regulate cell-mediated contraction in 3D collagen matrix models.

Cell migration in response to chemotactic signals was explored next by **Kees Weijer** (University of Dundee) as an important process during the development of multicellular organisms. He compared aggregation of cells to form the multicellular fruiting body to migration of single cells in embryos and showed that these cells have filopodia and lamellipodia when they move *in vivo*. Another model organism for studying developmental processes was illustrated in **Paul Martin**'s (University of Bristol) talk. Here, he described *Drosophila* dorsal closure, whereby a hole in the embryonic epithelium is zipped closed late in embryogenesis. This process is re-activated as part of the wound healing response and serves as an excellent, genetically tractable model for epithelial migration. With the use of live confocal imaging, Martin highlighted multiple roles for the small GTPase Rac in regulating epithelial cell morphology and migration. **Denise Montell** (John Hopkins University) showed how border cell migration in the *Drosophila* ovary is a good model for invasive cell behaviour, and the importance of cell polarity and chemotaxis in this migration.

The final session introduced another stimulating topic to the meeting, the role of cell-cell and cell-pathogen interactions. **Pascale Cossart** (Pasteur Institute, France) began by describing her work on the invasive bacterium *L. monocytogenes*. This bacterium exploits the host cell's own endocytosis machinery to invade. A cell surface protein, internalin, in the bacterial membrane binds to the E-cadherin receptor on the cell surface of mammalian cells, resulting in clathrin-mediated endocytosis of the parasite. **Michael Way** (Cancer Research UK, London) continued this theme by describing his work into how viruses invade cells and how non-muscle myosin 2 is involved in this process.

The topic of Rho GTPases was pursued further in talks by **Gilles Gadea** (Cancer Research UK, London), **Ann Ridley** (King's College, London) and **Vania Braga** (Imperial College London) all of which employed very different approaches in their work. Gadea created a

siRNA library targeting more than 80 GEFs and identified a role for Cdc42 in both mesenchymal and amoeboid modes of cancer cell migration, whereas Ann Ridley's work involved the use of Rac-deficient macrophages to deduce the role of specific Rac members in macrophage migration. The combined deletion of Rac1 and Rac2 led to altered cell morphology but interestingly did not prevent the migration or chemotaxis of macrophages. Vania Braga finished with a beautifully clear demonstration of the role of RhoE and calcium in the assembly of a layered epithelium. The very last talk by **Yoshimi Takai** (University of Osaka) was a comprehensive overview on the roles of nectin and nectin like molecule (Necl) and their involvement in contact inhibition.

The Abercrombie meeting was brought to a close by an engaging speech from **Joan Heaysman** and following the presentation of awards for the best posters and a final excellent lunch, we were let loose in Oxford. We recommend walking rather than taking the car to explore this beautiful city, not only to really see the great architecture but also to avoid the one-way systems in the city centre. All in all, the 6th Abercrombie symposium, proved to be a very successful meeting, from the high standard of talks, to the idyllic location and excellent hosts. The programme covered many interesting aspects of cell behaviour, including cytoskeletal dynamics, myosin motors and cell migration *in vivo*. It also allowed many young and enthusiastic scientists to contribute to the meeting by presenting their work in the form of posters. We would personally like to thank the BSCB for giving us the opportunity to attend our first ever Abercrombie symposium.

Hellyeh Hamidi (University of Manchester)
Stephanie Pellegrin (University of Bristol)

The Poster Prizes (a year's subscription to *Nature* or *Nature Cell Biology*) were awarded to **Seema Grewal** (University of Oxford) and **Gary Doherty** (LMB, Cambridge). We would like to thank *Nature* and *Nature Cell Biology* for the generous donation of these prizes. We are very pleased to announce that the next Abercrombie meeting will be held in 5 years time (2012), and Claire Wells (King's College London) has already agreed to be one of the organisers. Claire was a PhD student with Graham Dunn and Michelle Peckham, and then went on to work with Anne Ridley, and then Gareth Jones, and so the connection to Abercrombie will be continued.

Michelle Peckham (University of Leeds)

It has become a tradition for many scientists interested in cell motility to gather every 5 at in St Catherine's College in Oxford to discuss their last data and to remember the "father" of cell motility science – Michael Abercrombie.

The son of English poet Lascelles Abercrombie, Michael Abercrombie (1912-1979) began his scientific career in Embryology investigating chick embryos. Later, during Second World War he studied nerve regeneration and wound healing but still was interested in embryos development. Abercrombie noted that in 19th and early 20th centuries the role of cell locomotion (except for mitosis) had not been appreciated and he decided to study this process more particularly. In the 1950's Michael Abercrombie was the first who used cine-film to make some of the first time-lapse movies of cell motility.

Together with his colleague Joan Heaysman, Abercrombie made probably the most significant investigations of his career. Studying fibroblast migration they showed that each cell changed direction as it made contact with other cells. They found that the path taken by each cell was initially random until it made contact with another cell. The leading edge then ceased to protrude, the ruffling stopped and locomotion in that direction was halted. This process was called contact inhibition of locomotion. The novel line of investigations – the cell motility science – was started.

More than fifty years passed since that time and it is so wonderful that we have an opportunity to communicate with Abercrombie's colleague Dr. Heaysman, and with his progenies and to discuss the mechanisms and properties of one of the basic cell function – motility.

Different topics were talked over the meeting:

1. Mechanism of Actin Dynamics
2. Imaging Cell motility and Cytoskeletal dynamics
3. Motor Proteins and Adhesion Dynamics
4. Migration *in vivo*
5. Cell-Cell and Cell-microbial Interactions

The keynote lecture was held on by **Gary Borisy** (MBL Woods Hole, USA). He outlined the basic breakthroughs in cell motility science made by Michael Abercrombie, and concentrated on the problem of lamellapodia's growth. He talked about actin dynamic at the leading edge of the cell and different models describing how actin filaments push the membrane in protrusions.

Mechanisms of actin dynamics

This session began with **Jan Faix** (Hanover Medical School, Germany) presenting a novel mechanism of filopodium formation in *Dictyostelium* which postulates that initiation of filopodia could be an independent process from lamellipodia formation. **Marie-France Carlier** (CNRS, Gif-sur-Yvette, France) talked about the difference in functions of WH2 actin-binding domains in various proteins. This multifunctionality provides one actin-binding protein Spire (plays a role in oocyte polarity) with ability to sequester G-actin in complexes, to nucleate, sever and bind actin filaments at barbed ends and

modulate the dynamic of actin filaments and complexes of actin with other regulatory proteins. **Pekka Lappalainen** (University of Helsinki, Finland) reported the two distinct mechanisms of formation of dorsal stress fibers and transverse arcs, and their investigations in cardiomyocyte's actin dynamic. Plenty of live cell microscopy movies were demonstrated to illustrate all the discussed mechanisms.

Graham Dunn (King's College London, UK) described two methods of live cell imaging for investigation of actin dynamics in cells developed in his laboratory: FLAP (Fluorescence Localisation After Photobleaching) and DRIMAPS (Digitally Recorded Interference Microscopy with Automatic Phase Shifting). Using these two methods they showed that the G-actin dynamics in growing lamella is a high speed process which should involve active transport of G-actin to protruding zone. This process depends on MLCK and Rho kinase activity and is independent from microtubule dynamic.

Imaging cell motility and cytoskeletal dynamics

The session was opened by **Eric Sahai** (CRUK, UK) who discussed mechanisms of ameboid cancer cell motility and the role of PDK1 kinase and RhoE and RhoA. **Victor Small** (Institute of Molecular Biotechnology, Vienna, Austria) reported recent data in understanding of how actin filament network works in growing lammellipodia and filopodia. **Peter Friedl** (University of Wurzburg, Germany) made excellent report about collectively cell migration during invasion process. A lot of movies using time-resolved multimodal microscopy were shown to elucidate the difference in migration of different cell types on various matrixes and role of extracellular matrix degradation in migration process.

Carole Parent (National Institute of Health, USA) discussed mechanisms of chemoattractive effect of cAMP for Dictyostelium and a role of CRAC (Cytosolic Regulator of Adenylyl Cyclase) and PI3 kinase in cAMP signaling.

The final lecture of the first day was held on by **Gareth Jones** (King's College London, UK) and shed light on role of WASP in regulation of dynamic of the relatively novel actin structures – podosomes. In addition to such a fascinating and rich lecture session the poster session also was exciting and was accompanied with active discussions till late in the evening.

Motor Proteins and Adhesion Dynamics

The second day of the conference started with **Guillaume Charras** (LCN, UCL, UK) talking about spherical cellular protrusions called blebs and discussed the mechanism of their formation. These are of interest because blebs don't contain classical actin nucleators such as WASP, Arp and mDia, but contains small GTPases Rho, and it isn't clear how actin is nucleated in blebs. **Michael Sheetz** (University of Columbia, USA) reported different cell motility types and mechanisms which provide these types.

Michelle Peckham (University of Leeds, UK) reported about different classes of myosins particularly about Myo10 involved in formation of filopodia, Myo 6,7, *Dictyostelium* myosin MyoM and myosin 7a from *Drosophila*. All discussed types of myosin contain stable single alpha-helical (SAH) domain that stabilizes their monomeric form and function.

Margaret A. Titus (University of Minnesota, USA) studies function of myosin 7 and talin A in *Dictyostelium* and reported a mechanism of M7 stabilization of talin A and showed evidences that both proteins are the part of one dynamic adhesion complex on plasma membrane.

Migration *in vivo*

In this session, **Kees Weijer** (University of Dundee, UK) talked about experiments in *Dictyostelium*: how traveling waves of the chemoattractant cAMP coordinate the chemotactic movement of thousands of cells and whether chemotaxis plays a major role during development of higher organisms (using the model of cell migration during gastrulation in the chick embryo).

Paul Martin (University of Bristol, UK) talked about their studies in *Drosophila* embryos which help to understand the basic mechanisms of wound healing and noted the precise role of different small GTPases and their effectors in the process of *in vivo* inflammatory cell migration.

Denise Montell (John Hopkins University, USA) spoke about the model of Drosophila ovary which allows one to distinguish migratory cells from those which retain nonmotile during embryo development and illustrated the report with the fantastic time-lapse films. The role of cascade of STAT proteins, secretory factors and cell polarity protein Par-1 was discussed.

Michael Reichman (University of Muenster, Germany) reported that the migration of Primordial Germ Cells in zebrafish undergo a series of morphological alterations accordingly to their specification and showed lots of the time-lapse movies to prove it. Surprisingly these cells don't show enrichment of actin dynamic at the leading edge. They postulate that protrusions in these cells are driven by local increase in Ca^2+, myosin activation and bleb formation. The important role of myosin kinases was shown.

Cell-Cell and Cell-microbial Interactions

The next session was opened with the report of **Pascale Cossart** (Pasteur Institute, France) about the mechanisms which use bacteria to invade in mammalian cell. The recent experiments held on in the laboratory show unexpectedly that some bacteria use clathrin-mediated endocytosis machinery to penetrate into the mammalian cell.

Michael Way (CRUK, London, UK) discussed the analogous problem of the vaccinia virus infection of mammalian cells. How this virus uses the actin polymerization system of infected cell for invasion and myosin-based machinery of the cell for exit from cell and what proteins are involved in the processes.

Anne Ridley (KCL, London, UK) made a wonderful and detailed report of role and function of different Rho-GTPase isoforms during various motility processes in macrophages. **Vania Braga** (Imperial College, London, UK) continued the Rho GTPase theme and talked about Cdc42, Rac, RhoA, RhoE and showed their role in the process of epithelial differentiation.

The final lecture of the meeting was made by **Yoshimi Takai** (University of Osaka, Japan) and was connected with role of nectin and different nectin-like molecules in contact inhibition of cell movement. Different protein-protein interactions, which occur at the adhesive junctions at the leading edge of the cell between PDGF receptor, integrins, nectins and other proteins involved, were described in details.

I am sure that all participants would like to thank the scientific and RMS organizers for their hard work to make such great success conference.

Tatyana Kudryashova PhD
Russian Cardiology Research Centre,
Institute of Experimental Cardiology,
Laboratory of Cell Motility,
Moscow, Russian Federation

5th ISSCR Annual Meeting

17-20 June 2007, Cairns, Queensland, Australia

The international society for stem cell research is the premier society in the field of stem cells. The 4th ISSCR meeting in Toronto was very well organised with big names in the field of stem cells, which was very exciting for me and encouraged me to try to submit an abstract for the 5th ISSCR annual meeting in Australia.

My journey started at 7:15 am on 14th of June from Manchester and I arrived to Cairns at 6:55 am on 16th of June. I stayed in the Oasis resort hotel and shared it with Professor Kent Erickson (University of California, Irvine, and visiting professor at the Centre for Stem Cell Biology).

The meeting started and I set up my poster entitled: "Gonocytes: another source of pluripotent stem cells?". This led to a very interesting discussion with Dr Lee Turnpenny, who has published several papers with Dr Neil Hanley from Southampton University about derivation of human embryonic germ (hEG) cells and their differentiation to other cell types such as neurons. We both agreed that working with these putative hEG cells is more difficult and complicated than working with hESCs.

The most interesting and exciting research presented at the meeting was on the reprogramming of a somatic genome back into an embryonic epigenetic state using nuclear transplantation, and the production of a cloned animal or derivation of pluripotent embryonic stem cells with a reprogrammed nucleus. This work was presented for the first time in 4th ISSCR meeting in Toronto by Professor Shinya Yamanaka from Japan and he presented his latest work at this meeting (this work is published in *Nature*: 'Generation of germline-competent induced pluripotent stem cells"). Professor Rudolf Jaenisch then presented similar work (which is also published in *Nature*: "*In vitro* reprogramming of fibroblasts into a pluripotent ES-cell-like state").

Other research that I found to be particularly interesting was presented by Professor Engel from Germany. This work on getting offspring from mESCs was published in *Developmental Cell* – "*In vitro*-differentiated embryonic stem cells give rise to male gametes that can generate offspring mice".

I met Professor Karim Nayernia who is working in Newcastle University and was working with Professor Engel in Germany. I also met Dr Amander T Clark from LA, who published the first paper about germ cells differentiation from hESCs in 2004, and Dr Orly Lacham-Kaplan who is also well known in field of reproductive biology in Australia. She is working with Dr Alan Trounson and I know her from her talk in ESHRE2005 about teh derivation of germ cells from mouse ESCs which is published in 2006: "Testicular cell conditioned medium supports differentiation of embryonic stem cells into ovarian structures containing oocytes". There were several reports about the derivation of germ cells from ES cells and deriving stem cells from germline cells such as gonocytes stem cells and spermatogonia stem cells.

As I am from Iran I checked the number of abstracts from my country. 21 abstracts were accepted from Iran, most of which were from Royan Institute in Tehran in Iran. For example, Mehdi Pirouz, an MSc student at the Institute presented his research on the derivation of germ cells from hESCs. I also met Dr Baharvand, who is the head of the stem cell laboratory of the Royan Institute.

In general it was a very useful meeting with a good opportunity to meet people from around the world working on stem cells. I would like to express my gratefulness to the BAS, SRF, BSCB and ISSCR for the travel awards and supporting my work for presenting in 5th ISSCR meeting in Cairns in Australia.

Behrouz Aflatoonian
Centre for Stem Cell Biology
University of Sheffield

2007 ASCB-ECF Summer meeting: Dynamic Interplay between Cytoskeletal and membrane systems

27–30 June 2007. Dijon, France

The ASCB-ECF Summer meeting was organised by David Drubin (University of California), Daniel Louvard (Institute Curie) and Laura Machesky (University of Birmingham). It was a joint affair aimed at bringing together cell biologists from America and Europe for 3 days in the picturesque setting of Dijon.

The conference got of to a start with an inspirational talk from **Jennifer Lippincott-Schwartz** (National Institute of Child Health and Human Development, US) on the GTPase, dynamins' role in apical constriction and cytokinesis.

Thursday focused on **Organelle dynamics *in vivo*** which included talks from **Marino Zerial** (Max Planck institute of molecular cell biology and genetics, Germany) on quantitative image analysis of endocytosis and signalling, **Maxence Nachury** (Genetech, US) on the role of BBS proteins to promote ciliary membrane biogenesis and **Lois Weisman** (University of Michigan, US) on cyclin dependent kinase, cdk1.

The second session of the day was on **plasma membrane dynamics** with exciting talks from Sandra Schmid (The Scripps Research Institute, US), William Bement (University of Wisconsin-Madison, US) and Nobuhiro Morone (National Institute of Neuroscience, Japan). **Sandra Schmid** talked about SNX9 (a sorting nexin) and its role in actin-dependent membrane remodelling during endocytosis. As well as its localisation to clathrin coated pits, they have shown that SNX9 localises to other actin rich structures which are rich in GPI-anchored protein and involved with fluid phase uptake. Further investigation has also shown that SNX9 associates with N-WASP inducing the N-WASP/Arp2/3 dependent assembly of actin causing highly branched filaments. **William Bement** continued the actin theme with a talk on the control of actin assembly by compartment mixing during the regulated exocytosis in *Xenopus* eggs. Finally, **Nobuhiro Morone** gave an inspiring demonstration of electron tomography with 3-dimensional images of membrane compartmentalisation and the interplay between the membrane and cytoskeleton, made all the more novel by the handing out of 3D glasses.

Friday opened with a session on **molecular mechanics: lipid domains and forces** with talks from **Kees Jalink** (The Netherlands Cancer Institute) on the temporal and spatial aspects of PIP2 signals at the plasma membrane, **Olivier Rossier** (Columbia University) on actomyosin contractions builds bridges between adhesive contacts and **Danial Fletcher** (University of California) on the dynamic organisation of actin networks reconstituted on giant vesicles.

Session 4 was **cell motility and cancer cell invasion** with talks from Tatyana Svitkina (University of Pennsylvania), Danijela Vignjevic (Institute Curie), Britta Qualmann, (Leibniz Institute for Neurobiology) and Roberto Buccione (Consorzio Mario Negri Sud, Italy) among others. **Tatyana Svitkina** spoke about the roles of the Arp2/3 complex and mDia2 in actin-based protrusions, suggesting that their nucleation of actin results in the formation of filopodia and lamellipodia. **Danijela Vignjevic**'s talk was on the expression of fascin a target of beta-catenin-TCF signalling, during the migration, invasion and metastasis of colon cancer cells. A novel actin

nucleation factor, Cordon bleu was the subject of the next talk by **Britta Qualmann**. Here, the nucleation power is based on the assembly of three actin monomers in an actin cross filament orientation which in primary hippocampal cultures results in the increase of neurite induction and neurite branching. The final talk of the day was given by **Roberto Buccione** about invadopodia as specialised membrane domains. Tumor cells exude protrusions termed invadopodia which are rich in integrins, MMP's, factors of the tyrosine phosphatase pathway and actin and actin associated proteins. Here, they demonstrated how invadopodia exhibit polarised membrane trafficking, are cholesterol rich membrane domains and that

actin comets are present within invadopodial degradation sites.

The final session on **pathogens and phagosomes** was on Saturday morning, with talks from Jorge Galan (Yale University School of Medicine), Christoph Burckhardt (University of Zurich), Chantel Deschamps (Cochin Institut) and Lucas Pelkmans (Swiss Federal Institute of Technology Zurich). **Jorge Galan** described the reorganisation of the actin cytoskeleton as induced by Salmonella, SopE and SopE2 act as exchange factors for Rho GTPases and the introduction of sopB' s which act as inositol phosphate phosphatases and phosphoinositide phosphatases and sipA an actin nucleation factor all leading to the modulation of the host cell cytoskeleton. **Christoph Burckhardt** went on to talk about the computational dissection of adenovirus cell surface motion revealing receptor mediated virus drifting on filopodia. **Chantel Deschamps** then gave an interesting talk demonstrating the role of clathrin adaptor proteins AP-1 and AP-3 during phagocytosis, while **Lucas Pelkmans** discussed his labs current research on the endocytosis of simian virus40 particles by caveolae.

Poster sessions were held on Thursday and Friday evening with some great examples of recent developments in the field of actin dynamics. The small numbers at the meeting provided the perfect forum to discuss research and meet people who have similar research interests. I would like to thank the BSCB for their generous Honor Fell Travel Award which enabled me to attend this meeting.

Claire Butler
Institute of Health
University of East Anglia

IBRO 2007 Satellite Meeting: The secretory vesicle cycle and novel approaches to its analysis

9–11th July 2007. Brisbane

I attended the International Brain Research Organisation (IBRO) International Congress of Neuroscience in Melbourne, Australia in July 2007, partly funded by a grant provided by the British Society for Cell Biology. I am in the final year of my PhD and having never been to a large international conference before this was an excellent opportunity for me to present my data.

Accompanying the main meeting in Melbourne there were a large number of satellite meetings being held in other cities around Australia. My PhD is focussed on modifications of exocytotic proteins and the synaptic vesicle cycle, so the satellite meeting "The Secretory Vesicle Cycle and Novel Approaches to its Analysis", gave me a great opportunity to attend both a large international neuroscience meeting, and also a smaller meeting more focussed on my particular area of research.

This meeting was organised by **Yuri Ushkaryov**, (Imperial College London, UK), **Anthony Ashton** (University of Central Lancashire, UK) and **Fred Meunier** (The University of Queensland, Australia). The meeting was held at the University of Queensland in Brisbane and was sponsored by the British Chapter of the Society for Neuroscience, Scientifi, GRI, Fermentas, Jencons-PLS and AbD serotec. The quality of material presented at the meeting was very high and it was generally felt by all the attendees that the conference was exceptional.

On the first day there were excellent presentations on the vesicle cycle and synaptotagmin and also phosphoinositides. On day two we heard from the organisers regarding kiss and run exocytosis, protein phosphorylation and an outstanding presentation from **Richard Tsien** (Stanford University), regarding his work using quantum dots. Of particular interest to me was the afternoon session regarding SNARE proteins and their interacting partners. Finally, on the third day, attention shifted from exocytosis to endocytosis and we heard about mathematical modelling of vesicles and tubules, and also an excellent presentation from **Phil Robinson** (University of Sydney, Australia) regarding phosphorylation, dephosphorylation and regulation of dynamin. The conference was rounded off with a visit to a Koala sanctuary. Since the conference was relatively small it meant that the material presented was highly focussed, really relevant and the atmosphere was excellent.

This small focussed conference was in contrast to the very large main meeting in Melbourne, held at the Melbourne Convention and Exhibition Centre. Over 2000 delegates attended this five day conference, which was described as a conference to address exciting new dimensions in human brain research and function. Although I knew it was winter I still wasn't quite prepared for it to be quite so cold in Melbourne! It rained pretty constantly, but that notwithstanding Melbourne was still a great city to visit. It was wonderful to be able to leave the conference after a day of exciting scientific presentations and wander along the Yarra River. In the conference handbook Melbourne was described as one of the most dynamic cities of the Asia-Pacific region, a description which it certainly lived up to and Melbourne is a city renowned for scientific research and development, medical innovation and technological progress. The conference began with a fabulous performance of aboriginal dancing and music and there were many evening receptions to have a beer, relax and visit the many stalls and posters on show. But with 350 posters exhibited each day, it required a certain amount of planning to visit all the posters that were relevant to me! Although I have presented a poster at smaller conferences in the past, I felt it was a valuable experience to show my poster at such a large neuroscience conference.

Each day along with plenary lectures there were many sessions on a wide variety of neuro-scientific topics. I was particularly interested in sessions on memory formation and synaptic plasticity. There were excellent sessions on structural plasticity, protein trafficking, synaptic

plasticity and also lipid rafts and their contribution to neurotransmitter signalling. There were a number of outstanding plenary lectures, particularly those on aquaporins from **Peter Agre** (Duke University, USA) and functional studies at a single synapse from **Norio Akaike** (Kumamoto Health Science University, Japan). However my personal highlight of the entire conference was the plenary lecture given by **Mandyam Srinivasan** (Queensland Brain Institute, Australia). This was a really interesting insight into honey bee cognition and the way in which they navigate from hive to food. Although it is common knowledge that bees perform a 'waggle dance' to communicate to one another, it was intriguing to learn how bees perceive their environment and the way in which they judge distances. Although this topic is quite far removed from my research, it was an example of a truly fascinating lecture pitched at a level that everyone could understand and more importantly, enjoy.

The Gala Dinner was held in the Great Hall in the National Gallery of Victoria, which was a wonderful venue and it was a really enjoyable evening. It provided a great opportunity to meet some of the speakers and other delegates and share research interests and impressions of the conference. During dinner we were entertained by opera singers and afterwards the conference organisers led the way on the dance floor accompanied by a soul band. There were many social trips organised and I was able to visit the Dandenong mountains surrounding Melbourne, as well as the Great Ocean Road, which runs West from Melbourne along the coast. Having never been to a huge international conference before, I am very grateful to the BCSC for providing me with funding in order to be able to attend. It provided me with a valuable opportunity to present my data at a prestigious neuroscience conference as well as a focussed satellite meeting and also to attend a wide range of lectures on neuroscience in one of the foremost centres of brain research in the world.

Zoë Palmer
Department of Physiology
University of Liverpool

International Gap Junction Conference 2007

4–9 August 2007, Elsinore, Denmark

The International Gap Junction Conference takes place every two years, bringing together scientists from all over the world to communicate their latest findings. This five day conference, with more than 200 delegates, was packed with 68 platform and 125 poster presentations. The BSCB provided Honor Fell travel funding for 3 members of Nick Severs' laboratory from Imperial College London to attend this conference.

Gap junctions are specialised intercellular channels that allow direct cell-to-cell passage of small signalling molecules and ions. They are composed of proteins called connexins. The field of gap junctions has gained great importance over recent years, as modifications of these structures result in distinct human diseases ranging from cardiac arrhythmias to rare developmental disorders and congenital deafness.

The conference was held in Marienlyst, a conference centre in Elsinore, north of Copenhagen in Denmark. The hotel was not far from the world famous Kronborg Castle, best known as the setting for Shakespeare's 'Hamlet'. On arrival on Saturday night, we had a tour of the castle, followed by a reception with dinner and music in the Queen's Dining Hall.

The conference was officially opened early on Sunday morning with a keynote lecture by **Professor Michael Bennett** (Albert Einstein College of Medicine), introducing us to the controversial world of hemichannels. Throughout the session, new evidence supporting the existence and function of hemichannels was presented. However, some researchers have questioned their existence, arguing that hemichannels cannot be functional in the presence of normal extracellular concentrations of calcium i.e. in *in vivo* situations. The session ended with a presentation on another controversial subject, by **Professor Gerhard Dahl** (University of Miami). He presented a new interpretation of the activity of connexin mimetic peptides, calling for a re-evaluation of their mode of action. This was met with a spirited riposte from **Professor Howard Evans** (Cardiff University), who pioneered the development of these peptides.

The afternoon sessions were less controversial, encompassing innexins (invertebrate gap junction proteins), pannexins (mammalian innexin orthologs) and the life cycle of connexins. A highlight was the final talk of the day, by **Dr Andy Hunter** (Medical University of South Carolina) on interactions between connexin43 (Cx43), zonula occludens-1 (ZO-1) and N-cadherin in a cell model. Hunter has shown that by blocking the interaction between Cx43 and ZO-1, Cx43 gap junctions grow to a very large size and is currently investigating the hypothesis that ZO-1 mediates a link between Cx43 and N-cadherin in the adherens junction. The day concluded with a poster session in the evening to enable further discussion.

The second day (Monday) of talks focused principally on connexins in the cardiovascular system. The session **Connexins in the cardiovascular system** opened with a keynote lecture from **Professor**

Right: Members of the Severs' Lab at the International Gap Junction Conference dinner: Nicoletta Charolidi and Katharina Grikscheit (Left) and Alexandra Bruce (3rd from right).

Brian Duling (University of Virginia), who talked about gap junctions in smooth muscle and endothelial cells in the arteriolar wall. He summarised findings from connexin knockout mice and a myoendothelial cell model, highlighting the ability of connexins to interact with each other and with other molecules or channels, thereby establishing a complex signalling system with diverse functions in the arterial wall.

The first presentation by a member of our group was in the early afternoon session. One research interest in our group is the potential role of connexin-interacting proteins in human heart disease. **Dr Alexandra Bruce** (Imperial College London) presented data on the interaction between Cx43 and ZO-1 in human congestive heart failure. Cx43 is significantly down-regulated in congestive heart failure and this is associated with a decrease in the size of Cx43 gap junctions. The data presented showed that this occurs concurrently with increased expression of ZO-1 and an increased interaction between Cx43 and ZO-1, strongly suggesting a role for ZO-1 in the down-regulation and decreased size of Cx43 gap junctions in the diseased human heart.

Other presentations of particular interest to us, in terms of connexin-interacting proteins, were those by **Dr Heather Duffy** (Columbia University) on the regulation of Cx43 in myocardial infarction, and **Dr Glenn Radice** (University of Pennsylvania) on the affect of N-cadherin haploinsufficiency on cardiac gap junctions. Additionally, in two talks by **Miss Rosy Joshi-Mukherjee** and **Miss Eva Oxford** (SUNY Upstate Medical University), the interaction between Cx43 and plakophilin2 was proposed to play a role in arrhythmogenic right ventricular cardiomyopathy.

Following the platform presentations there was a discussion about connexin nomenclature. There is currently a discrepancy between the names of the connexin genes (e.g. GJA or GJB) and the names of the corresponding proteins (e.g. Cx43 or Cx45). In order to simplify the nomenclature, various proposals were made to rename the connexin genes and proteins so that the two are consistent. However, several senior members of the field argued that changes to the current nomenclature would affect previously published work. The debate on connexin nomenclature continues.

The day was concluded by another poster session, which included posters presented by three members of our group. **Nicoletta Charolidi** (Imperial College London), a final year PhD student, presented findings on the relationship between gap-junctional communication and properties of phenotypically modulated smooth muscle cells. Up-regulation of Cx43 in arterial smooth muscle cells is associated with phenotypic transition to a dedifferentiated synthetic and migratory phenotype, as occurs in response to arterial injury or atherosclerosis. She showed that siRNA-mediated suppression of Cx43 in a cell model does not affect contractile differentiation or synthetic activity. However, suppression of Cx43 reduces smooth muscle cell migratory activity, indicating a role for Cx43 in co-ordinating migration in synthetic state smooth muscle cells. **Katharina Grikscheit** (Imperial College London), a first year PhD student, presented data that continued the theme of connexin-interacting proteins in heart disease. She investigated the hypothesis that the up-regulation of Cx45, as reported in human congestive heart failure, is associated with a decrease in gap junction size. This was explored using a cell model, transfected to express an inducible amount of Cx45 in the presence of a stable, endogenous level of Cx43. We showed that with increasing expression of Cx45, the mean size of both Cx43 and Cx45 gap junctions was significantly reduced. **Dr Giselle Rowlison** (Imperial College London), a paediatric cardiologist and first year PhD student, presented a novel western blot technique that enables quantification of co-expressed connexins from cardiac myocytes and cell models that express more than one connexin.

Tuesday saw a more relaxed day, with two morning sessions on connexins in brain and nervous tissue. An interesting talk by **Dr Simon O'Carroll** (University of Auckland), demonstrated that the use of a Cx43 mimetic peptide prevented swelling, neuronal cell death and astrogliosis after spinal cord injury, suggesting a role for Cx43 in the spread of damage after spinal cord injury. In the afternoon, delegates were treated to a tour of Copenhagen, first by bus and then by boat through the canals of the city. There was the obligatory photo stop at the Little Mermaid (seen both from land and water) and we enjoyed several hours wandering around the city in the evening.

Wednesday morning was filled with presentations about connexin channel structure and function. There were presentations from several well established members of the gap junction community including **Dr Elke Winterhager** (Institute of Anatomy, University of Duisburg-Essen), who presented data obtained from intricate FRET-based assays on the interaction with Cx43 with the growth regulator NOV. Another presentation of note was by **Dr Paul Sorgen** (Univeristy of Nebraska Medical Centre), who provided an insight into the mechanism of the interaction between Cx43 and ZO-1 and how this interaction is disrupted by c-Src. The session was concluded with a presentation from another member of our group, **Priyanthi Dias** (Imperial College London), giving an overview of cellular and molecular models we use for the functional characterisation of connexin co-expression. There was a short session in the afternoon about connexins and panexins in the skin and sensory organs, before the last poster session of the conference.

The final evening of the meeting, saw the conference dinner. Dinner was preceded by drinks by the sea in front of the hotel (see photo), and entertainment was provided throughout the meal by an energetic magician. The highlight of the dinner was a speech by **Professor Howard Evans** (Cardiff University). Professor Evans was one of the founder members of the Gap Junction Conference

committee and is retiring at the end of this year. He gave an informative and entertaining account of how the field has grown over the last 20 years. The evening concluded with a disco that was enjoyed by all.

The final sessions of the conference were about the pharmacology of gap junctions. These presentations gave an interesting insight into the translation of gap junction research into the world of therapeutics. The keynote speaker, **Dr Stefan Dhein** (University of Leipzig), summarised data on up-to-date pharmacological tools, with respect to their mode of action. He outlined agents that promote gap-junctional coupling and uncoupling, agents that up-regulate connexin expression, and agents that down-regulate the number of channels by causing connexin degradation. The last presentation was by **Professor Richard Veenstra** (SUNY Upstate Medical University), who provided further evidence for the effects of rotigaptide, a mimetic peptide in clinical trials, for recovering ventricular gap junction properties.

Abstracts from this conference and selected papers (including data from Katharina Grikscheit) will be published in a special edition of the journal *Cell Communication and Adhesion* in 2008.

In conclusion, this meeting provided us with an invaluable opportunity to learn about the world of gap junctions outside our immediate area of work. We all came away from the meeting with ideas as to how our work can progress and with new contacts in the field of gap junction research. We would like to thank the BSCB for their funding that enabled us to attend the International Gap Junction Conference 2007.

Alexandra Bruce, Nicoletta Charolidi and Katharina Grikscheit
Cardiac Medicine
National Heart and Lung Institute
Imperial College London, UK

The International Gap Junction Meeting is held every two years with venues alternating between Europe and North America. The venue for 2007 was Elsinore, a town around an hour and half north of Copenhagen, and was organised by Zealand Pharma. There was a wide and varied program over the five days with both platform and poster presentations.

The first day began with a double session dedicated to hemichannels and their role in the gap junction field with several extremely interesting talks. **Michael Bennett** (Albert Einstein College of Medicine) started off the day with a keynote presentation entitled "Connexin hemichannels: they are real and do things". As the role, and indeed the existence, of hemichannels is highly controversial the discussions after presentations were lively to say the least. After the hemichannel sessions the talks moved onto the emerging field of pannexins and innexins before the day was rounded off with presentations on the life cycle of connexins. Day two was dedicated to the role of connexins in the cardiovascular system with 3 of the 4 sessions dedicated to this field with the final session of the day given over to connexins in development, reproduction and organogenesis. The first session of the day started with **Brian Duling** (University of Virginia) giving a keynote presentation entitled "Gap junctions and integrated cellular function in the arteriolar wall"

The next three days were half days with sessions only being held in the morning. Day 3 covered connexins in the brain and nervous tissue with keynote speaker **Maiken Nedergaard** (University of Rochester) commenting on the multiple roles of connexins in astrocytes starting off proceedings before several interesting and informative presentations were given. Zealand Pharma had organised a sightseeing tour of Copenhagen to revive us after an intensive first two and a half days. After a 1 hour guided bus tour we had a 1 hour canal tour around the city that was amazing. After the official tours were complete we had the rest of the day to explore by ourselves before heading back to Elsinore for a good nights sleep before the penultimate round of sessions.

Channel structure and function was the topic for the first two sessions of day 4 with presentations covering channel structure and function plus connexins and pannexins in skin and sensory organs. Presentations in the channel structure and function sessions were extremely interesting and informative with talks ranging from "Structural analysis of four Connexin26 mutant gap junctions and hemichannels" (**Gina Sosinsky**, NCMIR, Dept. of Neurosciences, UCSD) and "Structure of the N-terminal domain of Cx37 and functional consequences of amino acid deletions" (**Eric Beyer**, University of Chicago) both of which dealt with connexin mutations to "Mechanism of c-Src disruption of the connexin43/Zonula Occludens-1 Interaction" (**Paul Sorge**n, University of Chicago). I personally was disappointed with the third session on connexins and pannexins in skin and sensory organs as there was only one presentation on skin (**Masahito Oyamada**, Kyoto Prefectural University of Medicine, Japan) while all the others were on sensory organs.

The final set of sessions involved the pharmacology of gap junctions and as this was a session closely linked to my own work I found these sessions to be highly informative and interesting. The first session was sponsored by Wyeth Research and began with **Stefan Dhein** (Clinic for Cardiac Surgery, University of Leipzig) giving a keynote presentation entitled "Pharmacology of gap junctions" that covered the effect of various pharmaceuticals on connexins including my pharmaceutical of interest AAP10. One of my submitted abstracts had been accepted as a platform presentation and my supervisor **Dr Patricia Martin** (Glasgow Caledonian University) presented the data (entitled 'The antiarrhythmic peptide AAP10 enhances Cx43 and Cx40 expression and functionality by a protein kinase C dependent mechanism') in my stead to finish the session off.

Zealand Pharma sponsored the final session of talks which were focussed on antiarrhythmetic peptides and their effects. One talk in particular that I found highly interesting was by **Bjarne D. Larsen** (Zealand Pharma) who gave an overview of the history of peptides developed by Zealand Pharma in a presentation entitled "Discovery of novel potent and selective antiarrhythmic peptides – from AAP10 to stable, orally available small molecules".

The poster sessions were arranged in parallel with the platform presentations with three poster sessions spread out over the 5 days. In the first session, held in the evening of day 1, posters covering hemichannels, pannexins and innexins, life cycle of connexins and regulation of channel activity – topics covered in day 1 of the platform presentations – were on show while session two, held in the evening of day 2, was devoted to posters covering connexins in the cardiovascular system and connexins in development, reproduction

and organogenesis all areas which were the focus of presentation on day 2. The third poster session, in which my poster (entitled 'Characterisation of connexin mediated communication in the control of epidermal cell fate') was involved, rounded off the poster presentation and covered diverse topics such as connexins in the brain and nervous tissue, channel structure and function, connexins and pannexins in skin and sensory organs and pharmacology of gap junctions – all topics which were discussed during days 3 to 5.

Each of the three poster sessions were well attended although there were so many it was difficult at times to see all the posters I was interested in.

Overall, attendance at the IGJC was invaluable experience giving me the opportunity to understand where current research is in the Gap Junction field and the opportunity to present and discuss my data with the wider Gap Junction field. I would therefore like to thank the BSCB for awarding me an Honor Fell Travel Grant helping towards expenses for attending the meeting.

Jennifer Easton
Dept. Biomedical and Biological Sciences
Glasgow Caledonian University

Yeast cell biology

15–19 August 2007, Cold Spring Harbor Laboratory

After a long and exhausting transatlantic flight from London to New York, a quick glimpse at the Manhattan skyline and it was all worth it. About an hour on the Long Island Railroad train from New York and I was in Cold Spring Harbor, on a magnificent sunny and warm day.

The scientific programme provided an excellent balance between talks, poster presentations and coffee and lunch breaks, and no parallel sessions meant all the delegates could enjoy all the seminars. The weather was a nice mix of sweltering heat (most likely not enjoyed by anyone but me, having had a dreary, wet summer in London!) and torrential rain, but it did not stop the participants from walking around the campus or enjoying the poster sessions held outside the auditorium. It is also worth mentioning here that the very impressive and extremely enjoyable cocktail party and lobster banquet held on the last night of the meeting. Thanks to the Free Radicals for providing the soundtrack to great dance moves by all those who needed a break form the seriousness of the meeting!

Due to my own interests and the length of this report, only a small portion of the talks will be presented here, but I hope it will provide a taste of some of the highlights of this meeting. I therefore wish to apologise to the participants who do not see their work mentioned here.

The first session on **Chromosomes and Kinetochores** was kicked off by **Rodney Rothstein** (Columbia University, New York) with an interesting talk describing work on a screen for disruptions that alter spontaneous Rad52 focus formation. They have examined the movement of fluorescently-tagged proteins to repair foci in *S. cerevisiae*. The screen identified genes involved in the regulation of DNA metabolic processes and genes with a yet unknown function, whose deletion caused increased recombination centres, thus demonstrating the diversity of processes that protect the DNA from damage.

After a heavy, jet lag induced sleep and after an amazing American-style breakfast, I was ready for the second session, on **Cell Cycle and Division**. **Sheryl Elkin**'s (MIT, USA) talk was particularly interesting. She showed work done on Spo13, a *S. cerevisiae*

meiosis I-specific factor. Deletion of Spo13 leads to one meiotic division, while its overexpression in mitotic cells leads to metaphase arrest, suggesting that Spo13 must be degraded at the metaphasel/anaphase I transition. Their investigation of the events leading to the degradation of Spo13 identified the APC as the E3 ubiquitin ligase responsible for this degradation. The meiosis-specific depletion of the APC subunit Cdc27 leads to a stable expression of Spo13 throughout the meiotic divisions.

The first poster session, which also included my work on the crosstalk between the actin and the microtubule networks in a reconstituted *in vitro* system, provided a great opportunity to talk to fellow participants and share work and results and the discussions

carried on throughout the cheese and wine party that followed.

David Amberg (State University of New York, NY) showed data from his lab that underlined the physiological roles for actin redox control. Two conserved residues in the structure of actin, Cys285 and Cys 374 are susceptible to oxidant attach in both yeast and mammalian cells. Old Yellow Enzyme (Oye2) protects the yeast actin cytoskeleton from oxidation at these two sites, while premature ageing and cell death in oye2 deletion strains are suppressed by act1^{C285A} and act1^{C374A}. Actin purified from *oye2* deletion strains is oxidised, as shown by AMS treatment, which reacts specifically and irreversibly with SH groups, conjugating a 490 Da, negative moiety to the free cysteines. Addition of antioxidant suppresses *oye2* deletion actin defects, as well as cell death. Different mutants lacking one or more cysteines were distinguishable on Western blots. Mutants in which all four of actin's cysteines were mutated to alanine were thus created in order to elucidate the biochemical function of these residues. The double act1$^{C17,\ 217}$p, act1$^{285,\ 374}$p and quadruple act1$^{C17,\ 217,\ 285,\ 374}$p can be purified and even in the presence of the reducing agent, do not form high molecular weight aggregates *in vitro*. These mutants are currently being used to study the effects of actin oxidation on actin dynamics, both *in vitro* and *in vivo*.

The evening session on Trafficking also contained many interesting talks. **Felipe Santiago-Tirado** (Cornell University, New York) described his work on PI4P and its effects on the secretory functions of yeast Myo2p (a type V myosin). **Beverley Wendland** (Johns Hopkins University, USA) described her lab's work on the NPF-motif/EH-domain interactions between non-canonical clathrin adaptors and endocytic scaffold proteins and their critical role in endocytic events. One of the emerging conclusions was that the interaction between clathrin adaptors and scaffold proteins could be essential for the spatio-temporal regulation of clathrin-dependent endocytosis.

The fifth session, starting on Friday morning, included talks covering subjects from the cytoskeletal field. **Brian Galletta** from the Cooper lab (Washington University, St. Louis, USA) gave an insightful look into the roles of Arp2/3 regulators in actin assembly and endocytosis. One of the lab's main aims is to understand the dendritic actin nucleation model and how the regulation of the Arp2/3 complex by regulatory proteins influences the functions of actin networks. Actin patches, which contain actin filaments branched by the Arp2/3 complex and are sites of endocytosis, are characterised by changes in protein composition and motility. Their study involved creating mutations in all the Arp2/3 regulators in cerevisiae (Pan1, Abp1, Las17/WASp, type I myosins and Crn1). The assembly and movement of GFP-tagged patch components were then followed using high-speed confocal microscopy. The data gathered was quantified using computer-assisted particle tracking and motion analysis, which allows the detection of each patch in each frame taken over time and the creation of movement tracks. In one of the examples shown, the deletion of the C-terminus of Las17, the portion responsible for Arp2/3 binding led to an increased patch life. The data point towards an early role of Las17 in the assembly of the actin network necessary for the start of the patch movement. The defect in the late movement of endocytic particles provides further evidence that this movement is powered by Arp2/3-mediated actin nucleation.

The second poster session was held on Friday afternoon. **Roshni Basu** from Fred Chang's lab (Columbia University, New York) presented her work on Dip1p, a putative *S. pombe* WISH/DIP homologue. The WISH/DIP family of proteins are regulators of the Arp2/3 complex and inhibitors of formin-dependent actin nucleation (by binding to the FH1 and FH2 regulatory domains of formins). She showed that GFP-tagged Dip1p localises to the contractile ring and thus co-localises with the formin cdc12p, but not with Arp2/3. The deletion is viable and the cell polarity and cytokinesis are not affected, but preliminary data point towards an inhibitory role of Dip1p in cdcd12 regulation.

The evening session covered the topic of **Polarity and Morphogenesis** and **Maitreyi Das** from Fulvia Verde's lab (University of Miami, USA) talked about her work on Orb6, an *S. pombe* kinase that functionally interacts with Rga4 (a Rho-GAP) and its role in cell polarity control.

The Saturday session covered the **Physiology and Genomics** topic and **Owen Ryan** (University of Toronto, Canada) talked about their study into fungal dimorphism in budding yeast. They have created a yeast deletion collection in a dimorphic *S. cerevisiae* strain and they compared it to the commonly used lab strain S288C, which is defective for filamentous growth. The study identified phenotypic differences between these strains, such as genes that are non-reciprocally essential in their own genetic background. It also revealed that very many genes have a contribution to the dimorphic switching in *S. cerevisiae*.

Part of the **Organelle Biology** session, **Gerry McDermott**'s (National Center for X-ray Tomography, Berkeley, California) talk on quantitative 3-D imaging of yeast using soft X-Ray tomography proved to be extremely informative and interesting and his introduction to tomography/CAT-Scan using pictures of Fat Mango-the cat was the highlight of the morning session. X-ray tomography can be used to image the internal structure of any object, without its sectioning and this has been put to use for imaging the internal structures of yeast cells. This novel imaging procedure needs no cell fixation, refractive index effects are absent and the images obtained have a high contrast due to the transparency of water molecules and the absorbancy of biomolecules. Prior to analysis, the yeast cells are flash-frozen, loaded into a thin capillary and rotated in the X-ray microscope. This procedure gives rise to very detailed images of cellular organelles (including ribosomes and mitochondria) and provides information on the organisation of interphase microtubules.

In the same session, **Adabella van der Zand** (University of Utrecht, The Netherlands) described in great detail, with the help of impressive real-time fluorescence microscope pictures, the birth of peroxisomes, initially thought to be autonomous organelles such as mitochondria and chloroplasts. She showed that the formation of new peroxisomes in budding yeast is sustained by membrane-budding events at the endoplasmic reticulum, which supplies the lipid material for the formation of peroxisomal membranes.

This meeting proved to be a great success and I am grateful that the BSCB provided me with an Honor Fellowship Travel Award to cover for some of the cost of it. I have met a lot of interesting people and made a lot of friends too, so I am looking forward to next year's meeting!

Dana Gheorghe,
The Motors Lab,
Marie Curie Research Institute

European Muscle Conference

September 2007 Stockholm, Sweden

One of the biggest European meetings concerned with 'everything muscular' took place beginning of September in Stockholm. And despite the fact that the Swedish capital greeted the 230 delegates from 19+ countries with an early start into the fall of 2007 (wet, gusty and cold), the warm and cheerful atmosphere during the meeting compensated all attendees.

Founded in 1971, the European Society for Muscle Research started their annual European Muscle Conference (EMC) in 1972. Even with its European emphasis in the title, the EMC has always been an international conference, attracting delegates from countries outside of Europe, like the USA or Japan. This diversity is also somewhat mirrored in the topics of the 11 sessions, which covered areas ranging from 'cytoskeletal interactions and dynamics' to the long-time favourites 'actin-myosin interactions' and 'molecular motors' as well as comparatively new topics like 'gene therapy in muscle dystrophy'.

In four days, the conference covered 56 talks and about 150 posters with plenty of interesting and exciting new data. Highlights of the talks included the neat use of engineered TAT-fusion proteins (protein transduction) by **Ingo Morano** and his group from the Max-Delbrueck-Center in Berlin, Germany. He introduced an N-terminal peptide of the essential myosin light chains into intact adult cardiomyocytes using this protein transduction method to observe changes in their contractile state.

Marco Sandri (Venetian Institute of Molecular Medicine in Padova, Italy) presented insightful data about the importance of FoxO3 for the coordination of ubiquitin-proteasome and the autophagy-lysosome system. These two evolutionary conserved proteolytic systems control the half-life of proteins in mammalian cells. During starvation periods their activity is markedly enhanced to allow cell survival through degradation of proteins and organelles by lysosomal enzymes.

Frank Schnorrer (Institute of Molecular Pathology, Vienna, Austria) used an inducible RNAi library to perform a systematic genome-wide scan of genes required for muscle morphogenesis and -function in *Drosophila*. A video showed his rather 'unusual' method with 'high throughput' potential for impaired flight capability, which consists of a big measuring cylinder with some water at the bottom and a funnel on the top (you might get the idea).

Patrick Karlsson and **Lars Larsson** (University of Uppsala, Sweden) analysed the three dimensional organisation of nuclei in skeletal muscle fibres for the understanding of basic mechanisms underlying muscle wasting. The interdisciplinary collaboration between the universities 'Centre for Image Analysis' and the 'Department for Clinical Neurophysiology' develops advanced image analysis tools for conventional confocal microscopy images that facilitate the rapid investigation of spatial parameters of myonuclei organisation. **Lars Fraengsmyr** (Umea University, Sweden) introduced in his talk the use of high-throughput methods for the investigation of differences in the proteome between distinct muscle types. Applying two-dimensional fluorescence difference gel electrophoresis (2-DIGE) followed by mass spectroscopy, he was able to identify 44 distinct proteins that were differentially expressed in extraocular- compared to psoas-muscle. In the presentation of his poster he additionally studied proteomic differences in skeletal muscles after eccentric exercise, endurance training and strength training using these methodologies. Out of 2300 identifiable protein spots from the 2-DIGE assay, he identified a subset of candidate proteins that were uniquely regulated for each of the three different exercise types.

The European Society for Muscle Research awarded also two poster prices among the participants of this years European Muscle Congress. One of the two winners was **Anke Zieseniss**, a postdoc in Carol Gregorio's group from the University of Arizona, USA. Her work on Lasp-2, a newly identified muscle protein from the nebulin family of actin-binding proteins and its expression, sarcomeric localisation and ligand interactions showed impressively the functions of this protein as a scaffolding and actin filament organising protein within the sarcomeric Z-disc.

The second winner of the annual poster award was (to my great surprise) the author of this article. I am not going to write here about my work, however it is always very pleasant to get positive feedback, such as the BSCB Honor Fell Travel award or a poster award. I would also like to mention that the co-authors on the poster, especially Atsushi Fukuzawa and Mathias Gautel from King's College London contributed to this success. By the way: the award was a set of Swedish designer coffee-mugs (to be used during the long hours in the lab?) and a cheese slicer.

Besides the talks and poster-sessions, many scientific discussions take place during the social events of a congress. During the first of the organised social events we enjoyed a guided tour of the Vasa maritime museum with a subsequent gala dinner. Eating fish in (almost) all its varieties and drinking wine besides the restored remains of a 300-year-old impressive looking wooden battleship (that sunk 30 minutes into its maiden voyage) is a truly unique experience. The second event was a boating tour of Stockholm's waterways followed by a visit of the city hall and a concluding reception in the 'Golden Hall'. The city hall's 'Blue Room' is used as dining hall for the banquet following the annual Nobel Prize award ceremony. Most of the congress participants took great joy in 'training' to enter the Blue Hall via the big stairs (the official route for the laureates).

Next years EMC will take place from the 13th to the 16th of September 2008 at Keble College in Oxford. The upcoming meeting will be organised by Steve Marston and Charles Redwood. Further information can be found on the European Society for Muscle Research website http://www.esmr.org.

Stephan Lange
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North of England Cell Biology Forum 2007

14 September 2007, Liverpool Cancer Research Centre.

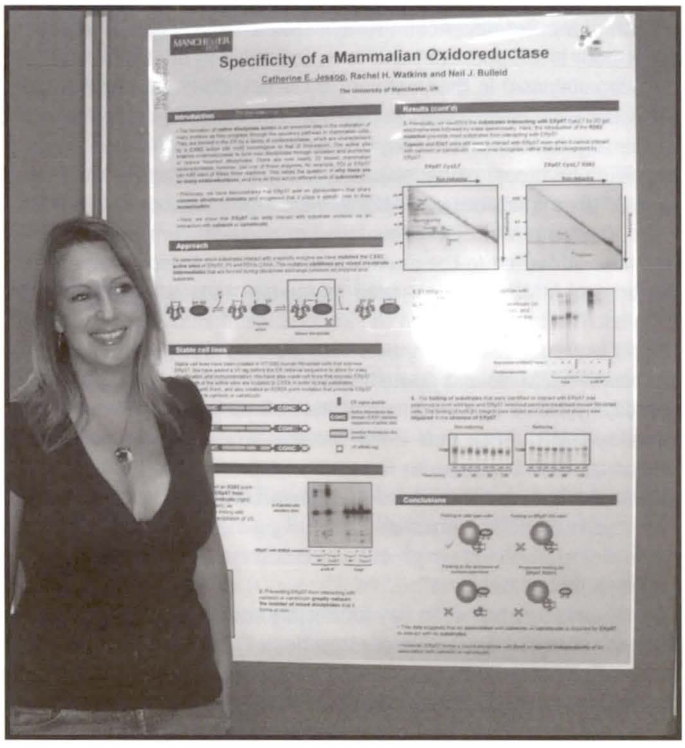
Liverpool was the 2007 host of this meeting, organised by Sylvie Urbé and Alan Morgan, which has been held on an annual basis since 2004.

Originally conceived by Liz Smythe at the University of Sheffield as a small meeting bringing regional cell biology groups with a particular interest in membrane trafficking together, this One-day Forum has expanded over the years to a fully grown meeting attracting this year over 100 participants from more than 20 research groups (from Sheffield, Manchester, Leeds, York and Liverpool).

One of the key remits of this meeting is to give junior researchers the opportunity to present their work in front of a larger critical audience, hence all talks are given by PhD students and Post-doctoral fellows. Equally the chairing of the sessions is taken care of by junior scientists, whilst everybody is joining in the discussion. This year, 12 talks and 18 posters were presented on a variety of topics ranging from growth factor receptor signalling, trafficking in the endocytic and biosynthetic pathways, protein folding in the ER, through to studies on primary cilia formation and peroxisome inheritance.

New this year, was the award of prizes (provided by Qiagen) for the best presentations which went to **Yuichi Morohashi** (Lowe lab, best talk; above, left), **Catherine Jessop** (Bullied lab, best poster; right) and **Ben Cross** (High lab), who presented an excellent talk and poster (above, right).

Sponsorship from the British Society for Cell Biology, the Biochemical Society and the University of Liverpool, enabled this highly successful meeting featuring top quality research and promoting many new interactions between Cell Biology researchers within the region. Having previously been held only at Sheffield and Manchester, this Forum will now travel first to Leeds (September, 2008) and then to York (2009). This unique forum has rapidly become a fixture in the autumn calendar and joins the increasing number of one-day meetings that have sprung up all around Britain (e.g. the Membrane Traffic UK meeting in London and the Actin meeting in Bristol), and which are all benefiting from BSCB sponsorship made possible by your membership contributions.



5th General Meeting of the International Proteolysis Society

20–24 October 2007. University of Patras, Patras, Greece.

The 5th General Meeting of the International Proteolysis Society was organised by Georgia Sotiropoulou (Patras, Greece, Chair), Francesc Xavier Avilés (Barcelona, Spain, vice chair) and Matthew Bogyo (Stanford, USA, vice chair) and brought together scientists from around the world to discuss the many varied aspects of proteases and protease inhibitors.

The major goal of the meeting was to highlight the most exciting advances in the structure, function and regulation of proteases and protease inhibitors; with emphasis on the most recent methodologies used to view the effects of proteases. State of the art research was presented in all aspects of protease biology with 12 plenary sessions and three lunchtime workshops. At least 104 talks were given and 330 posters presented; with 472 people attending it was a very large and diverse meeting. The main topics included the role of proteases and protease inhibitors in development, differentiation, apoptosis, aging, angiogenesis, tumour progression, immunity and tissue remodelling.

The conference was opened with a welcoming address by the organiser **Georgia Sotiropoulou**, followed by a very informative talk on the cultural history of the city of Patras (**Michalis Petropoulos**, 39th Ephorate of Prehistorical and Classical Antiquities of Arkadia, Greece). 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 of the lectures which I particularly enjoyed.

One of the most interesting talks of the meeting was in the last session of the 3rd day. **Achim Krüger** (München, Germany) talked about both broad spectrum and specific inhibition of MMPs (matrix metalloproteinase) in the treatment of cancer. Many specific proteases have been shown to be involved in the progression of cancer and tumour metastasis; however there is currently no promising treatment using inhibitors of these proteases. Initial data showed the importance of MMPs in cancer progression; however the broad spectrum MMP inhibitors failed in phase III clinical trails. This was later attributed to the multitude of different physiological functions of MMPs including both pro and anti-tumourogenic features. The talk focused on the importance of studying the many interactions between MMPs, their inhibitors the TIMPs (tissue inhibitors of MMPs) and downstream effector molecules. Achim specifically talked about the role of the natural broad spectrum MMP inhibitor, TIMP1 in cancer. It has previously been shown that increasing TIMP1 expression is negatively correlated with cancer patient survival. Achim showed that when TIMP1 was inhibited in a liver cancer model a metastasis promoting gene expression profile in the liver was observed which increased susceptibility to secondary scattered metastasis.

In the closing session on day four of the conference, the plenary lecture (sponsored by Boehringer Ingelheim Ellas S.A) was presented by **Guy Salvesen** (Burnham Institute of Medical Research, USA). The talk focused on apoptosis and how the pathways involved in this process can teach us much about the function and activation of proteases. Guy talked about the minimal two step activation cascade at the heart of apoptosis. Apoptosis is initiated by ligation of death receptors, developmental cues or stress and it is these events that result in the activation of apical caspases, which then activate effector caspases. The talk concentrated on both the biochemical and structural features of caspase activation and inhibition. Determining how apoptosis is regulated through the participation of members of the caspase family of cysteine proteases gives us the opportunity to understand the processes which regulate these proteolytic pathways.

The three lunchtime workshops were also very interesting and covered in detail some new and exciting methods and experimental techniques being used in proteolysis research. The workshops included sessions on; imaging protease function, technology platforms for drug discovery and development and applications of mass spectrometry for identification of protease substrates.

The session covering the **imaging of protease function** particularly stood out for me. It was sponsored by Carl Zeiss Microimaging and included five talks which were then followed by a practical demonstration of some of the equipment. The talks looked at the cutting edge technological development in fluorescence microscopy and boasted some fabulous images of proteases in live cells. The proteases had been monitored through GFP tagging of the trafficking pathways alone or in combination with visualisation of substrate cleavage. These types of technique are tipped to become more and more important as scientists require more demanding in vivo approaches that are able to visualise proteases and their specific targets. Speakers in this session included **Klaudia Brix** (Jacobs University Breman, Germany), **Chris Jedeszko** (Wayne state University, USA), **Maria Iolyeva** (Jacobs University Breman, Germany), **Galia Blum** (Stanford University, USA) and **Rene Hessling** (Carl Zeiss Microimaging, Germany).

Overall the meeting was entertaining and interesting covering a huge variety of topics in proteolysis biology. It was very useful to have talks on the research people are currently carrying out and also the techniques used to acquire this type of data. I would like to thank the BSCB for awarding me an Honor Fell Travel Award, which enabled me to attend this conference.

Laura Wagstaff
Biomedical Research Centre
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Tumor–Host Interaction and Angiogenesis: Basic Mechanism and Therapeutic Perspectives

27–31 October 2007. Ascona, Switzerland

This conference took place in one of the breathtakingly beautiful places on the earth and was organised by Curzio Ruegg, from ISREC, Switzerland and Ivan Stamenkovic, University of Lausanne, Switzerland.

The meeting was attended by fewer than 80 people and was very focussed on various aspects of tumor angiogenesis. There were 8 sessions spread across 5 days and a poster session. They had also chosen few posters for short oral presentation. Monte Verita, the place where it held, was designed for the conferences with well equipped conference room, restaurant and dining area, computer room and accommodation for delegates. It is also situated on the top of a mountain and gave panoramic views through our windows.

The conference started with an evening session on the molecular pathways to design anti-angiogenic therapies and was presented by two notable scientists in the field, **Peter Carmeliet**, Katholieke Universiteit Leuven, Belgium and **Kari Alitalo** from University of Helsinki, Finland.

Tumor Angiogenesis

Raghu Kalluri (Beth Israel Deaconess Medical Centre, Boston, USA) talked about the tumor microenvironment and its influence on cancer. He approached the subject by simple questions such as 'what is a fibroblast?' and talked about the role of fibroblasts in cancer. He also discussed the extracellular matrix, innate immunity in cancer progression and metastasis. The next talk was by **Masabumi Shibuya** from Tokyo Medical and Dental University, Japan. He identified the Vascular Endothelial Growth Factor Receptor 1 (VEGFR1) and had given the name Flt1 to it (which is the other name for the receptor and still in use). He discussed the role of VEGFR1 in tumor angiogenesis and metastasis. **Kairban Hodivala-Dilke** (Queen Mary`s School of Medicine and Dentistry, London) discussed her work on $\alpha V\beta 3$/ $\alpha V\beta 5$- integrin inhibitors which are anti-angiogenic drugs and are in pre clinical trials. Surprisingly, at very low concentrations, these inhibitors can stimulate the tumor growth and tumor angiogenesis in animal models. This makes us wonder about the complexity of anti-cancer drugs which are promising but need to be designed efficiently. This session concluded with talks on genome-scale approaches to the cancer microenvironment by **Sridhar Ramaswamy** (Harvard Medical School, USA) and on the impact of host derived MMPs (matrix metalloproteinases) in bone metastasis by **Conor C. Lynch** (Vanderbilt University, Nashville, USA).

Invasion and metastasis

This session began with a presentation by **Paolo Comoglio** (University of Turin medical School, Turin, Italy). He talked passionately about the invasive growth as a MET proto-oncogene driven genetic programme for cancer and stem cells. He made it very humorous as well so that people don't feel sleepy listening to his talk which was immediately after the lunch! We had the poster session in the evening. There were only 17 posters and hence it was quite easy to look at each poster and talk to people. I presented a poster entitled "The regulation of the endocytic trafficking in endothelial cells and its contribution to angiogenesis" in this session and had a very good discussion with other scientists.

Tumor-Host Cross Talk

Frederic J de Sauvage (Genetech Inc San Francisco) talked about the deregulated Hedgehog signaling pathways in basal cell carcinoma (BCC) and in meduloblastoma and about the small antagonists of the pathway which could provide a new therapeutic opportunity for these tumors. **Stefano Indraccolo** (Instituto Oncologico Veneto, Padova, Italy) presented his results to support that the upregulation of angiogenic switch in tumor microenvironment increases the Notch 3 signalling in tumor cells which contributes for the escape from tumor dormancy and growth of T cell acute lymphoblastic leukemia (T-ALL). **Francois Lehembre** (University of Basel, Basel, Switzerland) convinced us that the loss of E-cadherin function contributes to tumor invasion by up regulating NCAM expression and thus provoking a stabilization of focal adhesion in epithelial cells.

Transcription factors

Tatiana V. Petrova (University of Helsinki, Finland) talked about the transcription factor PROX1 as a key contributor to the malignant progression of colon cancer, and **Nick Barker** (Hubrecht Institute, The Netherlands) presented his data on the gene LGR5 as a marker gene in identifying the stem cells in small intestine and colon.

Inflammatory, immune and bone marrow derived cells

Theresa Whiteside (University of Pittsburg Cancer Institute, USA) talked about the mechanisms, solutions and the role of tumor stroma in the tumor escape from the host immune system. **Jeffrey Pollard** (Albert Einstein College of Medicine, New York, USA) presented some interesting data on how the tumor microenvironment educates the tumor associated macrophages (TAMs), which are abundant in hypoxic region of the tumor, in breast cancer model in mice to promote tumor progression and to enhance metastasis. On the contrary, **Claire E Lewis** (University of Sheffield Medical School) suggested that these macrophages can be exploited to deliver gene therapy to tumors. Her group has developed a novel technology to manipulate these macrophages to synthesize and deliver therapeutic virus to the hypoxic regions of the tumor which are otherwise the most inaccessible areas.

Hypoxia and metabolism

This session included two talks on HIFs (hypoxia inducible factors), hypoxia and cancer by **Jacques Pouyssegur** (Institute of signaling, Developmental Biology and Cancer Research, Nice, France) and by **Celeste M Simon** (University of Pennsylvania, Philadelphia, USA). The last talk was from **Curzio Ruegg** (University of Lausanne, Switzerland), who is trying to solve the nature of aggressive tumors which recur after radiotherapy. His group is interested to know the role to irradiated stroma in contributing to this phenotype of relapsed tumors and has a goal to identify candidate therapeutic targets in patients at high risk for metastatic progression after adjuvant radiochemotherapy. All these talks were followed by interesting discussion by participants. Apart from the good scientific talks we also enjoyed good food and drinks.

It was a very interesting conference in a beautiful place indeed. The train journey from Ascona to Zurich was a spectacular one with mountains turning red in the autumn. Prof. Ruegg and Prof. Stamenkovic organize this conference once in two years in the same venue.

I thank BSCB profusely for the Honor Fell Travel Grant to attend this conference.

Vrinda Nayak, Department of Biochemistry, University of Bristol

Society for Neuroscience

3–7 November, 2007. San Diego Convention Center

The 37th annual meeting of the Society for Neuroscience was held from the 3rd – 7th November 2007 in San Diego, California. With over 30000 people attending, this conference can be a particularly daunting prospect. However, having attended the previous meeting in Atlanta in 2006, I had a better idea of what to expect and how to prepare myself for the vast poster sessions that lay ahead.

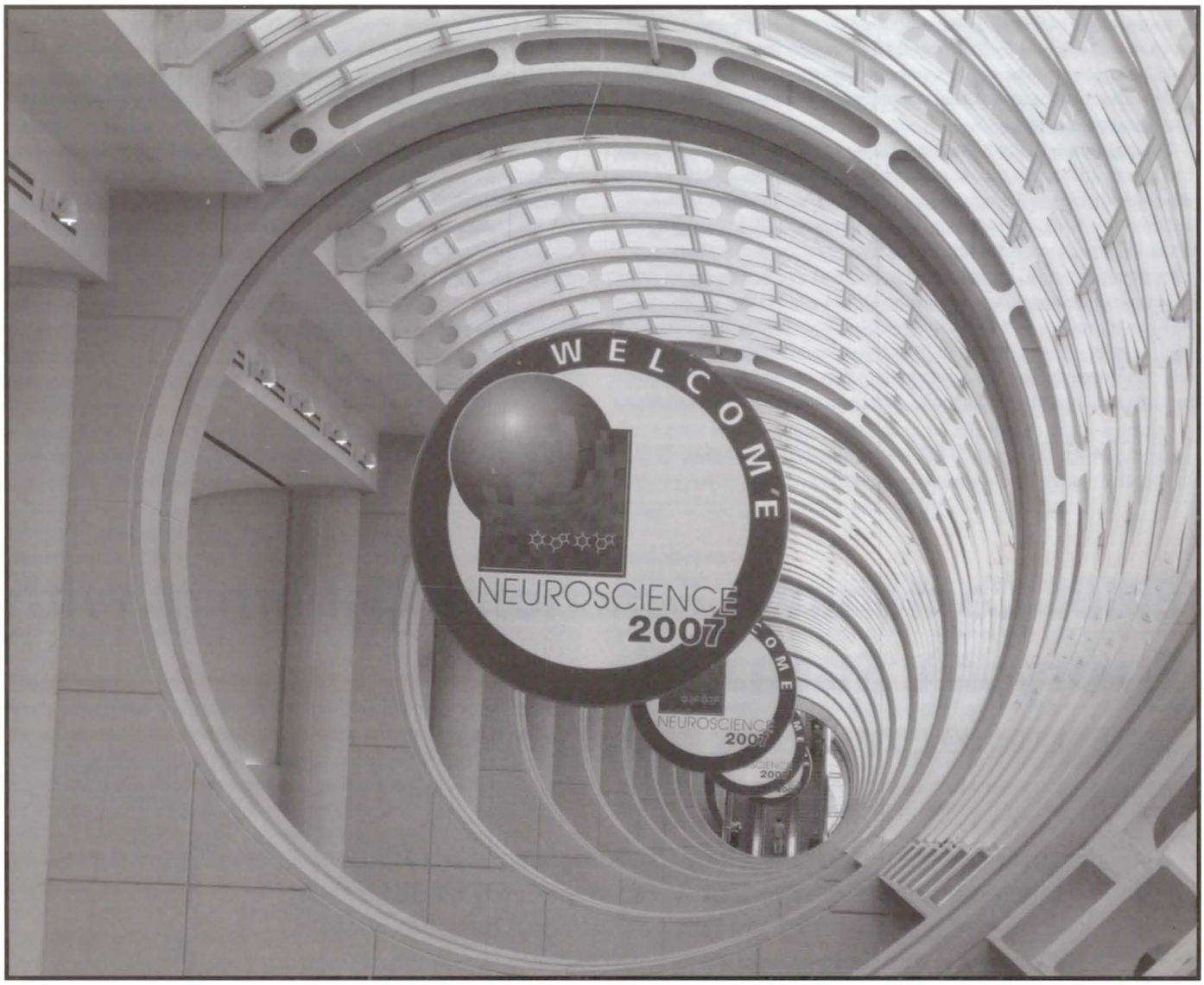
On the first day we were welcomed by glorious sunshine and an impressive venue: the San Diego Convention Center. As previously, the conference was well organised and registration went smoothly, allowing attendees to get straight into the first poster sessions. My research is focussed on the neuroscience of pain and I was pleased to see several poster sessions dedicated to aspects of this field on each day of the conference.

The first session included two interesting posters from **Jeff Mogil**'s Pain Genetics Lab (McGill University), whose research investigates the relationship between genetics, the environment and pain. Following their paper examining the effect of empathy on pain in mice (Langford et al., 2006), they presented research looking at the same phenomenon in humans. Painful thermal stimuli were applied to the back of the hand and pain intensity and unpleasantness was quantified using the visual analogue scale (VAS). Feelings of empathy were generated by showing subjects one of two recorded interviews of an actor which were designed to elicit either high or low empathy feelings, which were also rated. The high empathy group showed increased pain scores (both sensory and affective) when given painful but not non-painful thermal stimulation, demonstrating that compassion can increase pain perception in humans.

They also presented data investigating the impact of the presence of a human experimenter during behavioural pain testing using the formalin test. Administration of formalin to the hind paw produced characteristic pain behaviours that were scored from video footage. They observed that the presence of an experimenter in the room while the behaviour was being recorded had an analgesic effect, i.e. less pain behaviours were observed. Further experiments provided evidence showing that this effect was directly due to the presence of a pair of eyes in the room and was opioid-mediated and testosterone-linked and is likely to be due to stress-induced analgesia and may be predator-related. These findings may impact the way behavioural tests are performed and demonstrate that in some cases it could be more appropriate to use female mice, where this response was absent.

On Sunday morning there was an interesting seminar from **George Walker**, Director of the Carnegie Initiative on the Doctorate (CID), detailing the work the CID has done with a wide range of neuroscience departments across America to improve the way PhD programmes are run. This innovative project aimed to engage departments in a process of self-discovery to assess whether they were producing doctorate researchers who not only possessed the technical expertise to become good scientific researchers but also developed a range of other skills including the ability to mentor, to critically review the work of others, to develop collaborations and to drive their own research forward.

My research centres on the role of acid signalling in pain, particularly that which is mediated by acid-sensing ion channels (ASICs). These ion channels are also implicated in other neurological roles and ASIC1a knockout mice have an anxiolytic phenotype. **Jason Dwyer** (Wyeth Research) demonstrated that ASIC antagonists, particularly those specific for ASIC1a, had anxiolytic effects in a range of behavioural models in mice and that these effects may be mediated by an increase in the inhibitory neurotransmitter GABA in the amygdala. Therefore ASIC1a presents a novel target for the development of anxiolytic compounds. This was further supported by data from John Wemmie's lab (University of Iowa) showing that the normally anxiolytic ASIC1a knockout mouse had increased fear conditioning when an adenoassociated virus 1 was used to induce ASIC1a expression in the amygdala, demonstrating the importance of this brain region for the modulation of anxiety levels. A second poster from this group suggested that



ASIC1a in the amygdala may respond to protons released either from synaptic vesicles or due generalised brain acidosis in a model of CO2 inhalation. In this model, the ASIC1a knockout strain again showed reduced anxiety-like behaviours.

On Monday, data from **Candice Askwith**'s lab (Thomas Sherwood, Ohio State University) demonstrated further evidence of peptide modulation of ASIC currents by RFamides. Non-activating decreases in pH can lead to steady-state desensitisation of ASIC currents and enhancement of this phenomenon may be neuroprotective in circumstances such as ischaemia. This steady-state desensitisation is inhibited by RFamides and this inhibition is dependent on channel subtype.

Apkar Vania Apkarian (Northwestern University) chaired Tuesday morning's symposium titled "The Brain in Chronic Pain", which showed how improvements in brain imaging techniques have been applied to chronic pain research. **Karen Davis** (Toronto Western Research Institute) described the complexities of studying functional diseases, where often no structural pathologies are apparent, and how fMRI can be used to try and reveal neurobiological abnormalities in patients affected by such diseases. She went on to look at the relationship between pain and attention and the role of personality in altering pain perception. Finally she commented on the factors that must be addressed before fMRI can be used as a diagnostic tool, particularly the determination of 'normal' brain activity and how abnormalities could be defined. Irene Tracey (Oxford University) went on to further describe the role of the brainstem in central sensitisation and chronic pain. She also discussed the pharmacological challenges faced by the pain field and championed the need for reverse translation of fMRI based research techniques back into animal models as a way to help produce drugs for the treatment of chronic pain.

I presented my poster on the modulation of visceral inflammatory pain by acid-sensing ion channels on Tuesday afternoon and I was really encouraged by the amount of interest it generated. I had some very fruitful discussion with scientists from a range of fields and some of the challenging questions addressed will certainly help me in writing my PhD thesis!

On the final morning I was pleased to be able to attend a minisymposium dedicated to the "Emerging Roles of Acid-Sensing Ion Channels in Neurological and Psychiatric Disorders" chaired by **John Dunlop** (Wyeth Research) and **John Wemmie** (University of Iowa). **Candice Askwith** (Ohio State University) opened the session with further data showing modulation of ASIC1a steady state desensitisation (SSD) by peptides. She also showed that the ASIC1a-specific toxin Psalmotoxin 1 (PcTx1) has its antagonistic effects by enhancing SSD, but if SSD is not induced by small, non-activating decreases in pH then PcTx1 can actually enhance ASIC1a currents. Further work comparing mouse and human ASIC1a channels showed that a larger population of endogenous peptides were able to interact with human ASIC1a to inhibit SSD, suggesting that blockade of these peptides would have greater neuroprotective effects in humans than research using mice models suggests.

Zhigang Xiong (Legacy Research) described the lack of success of NMDA receptor antagonists in treating ischaemic cell death and the potential role of ASIC1a in glutamate-independent calcium toxicity. Acidosis occurs during ischaemia due to anaerobic metabolism and

this can cause neuronal injury via activation of ASIC1a and entry of calcium into neurones. Neuronal death after ischaemia is reduced in ASIC1a knockout mice and also when using the ASIC1a antagonist PcTx1 and this antagonist has a longer time window for treatment that glutamate antagonists.

Manual Friese (Oxford University) showed interesting new data on the role of ASICs in a mouse model of multiple sclerosis (MS). Using the experimental autoimmune encephalitis (EAE) model of autoimmune CNS inflammation, he demonstrated that physical disability correlated best with axonal degeneration rather than demyelination. ASIC1a was again implicated in the process as the inflammatory environment has an acidic pH which may cause ASIC1a activation, allowing calcium entry leading to cell death. The ASIC1a subtype was protected from behavioural changes associated with EAE even though the inflammation that occurred was equivalent to that seen in wild type animals. These changes were accompanied by a profound drop in neuronal number that was reduced in ASIC1a knockout mice and after treatment with PcTx1. These exciting findings suggest that ASIC1a may be an important target for preventing disease progression in MS and clinical trials are planned to assess this.

This minisymposium was a great way to end the conference, highlighting the diverse roles that acid-sensing ion channels play in neurological function and giving me ideas for where I would like to take my research in the future. Presenting my own data at SfN was also a rewarding and valuable experience and the feedback I received will be very useful in completing my thesis and in my final viva!

Amelia Staniland
London Pain Consortium
King's College London

EMBL Conference: Functional Genomics With Embryonic Stem Cells

24–26 November 2007. EMBL, Heidelberg, Germany

The conference was organised by the European project FunGenES (Functional Genomics with Embryonic Stem Cells) funded by the 6th framework project of the European Union. The conference summarised the findings resulting from this 4 year collaboration involving 18 industrial and academic research groups from across Europe.

The aim of the FunGenES was to identify subsets of genes with activity at the various stages of murine embryonic stem (mES) cell self-renewal, differentiation, lineage commitment and development into somatic cell types. Encompassing this, the conference covered five aspects of mES cell gene expression mapping; Technology, Self-renewal, Mesoderm, Ectoderm and Endoderm.

Technology

A variety of techniques had been used by collaborators and this session of the conference provided an insight into this technology.

Frank Edenhofer (University of Bonn, Life & Brain Center, Germany) discussed the limitations of DNA transfection and viral transduction before introducing the delivery of macromolecules using protein transduction domains. This new method involves a TAT modification at the site specific recombinase Cre in fibroblasts, murine (m) and human (h)ES cells whilst over-coming geno and cyto-toxic effects associated with classical over expression methods. Using this technique to over express Cdx2 in hES cells revealed a conserved role for Cdx2 in both hES and mES cells. In the same session **Frank Buchholz** (MPI-CBG, Dresden Germany) used a genome-wide RNA interference screen to identify novel genes that maintain self-renewal. Paf1 when targeted by esiRNA promoted differentiation towards ectoderm and mesodermal lineages.

Lisa Dailey (NYU School of Medicine, USA) described a novel approach that will allow the identification of active transcriptional regulatory elements from purified DNA from nucleosome-free regions. Application of this method for ES cells is hoped to identify new enhancer elements. **Konstantinos Anastassiadis** (Biotech Dresden, Germany) spoke about the construction of an inducible cDNA library that allows large-scale gain of function screens using the tetracycline-inducible system. **Jack Vilo** (University of Tartu, Estonia) discussed a bioinformatics computer application that allows instant cross-referencing of ES cell genes with genes from other systems and linking of microarray data for more detailed analysis.

Self-Renewal

One of the unique properties of ES cells is their ability to self-renew whilst maintaining pluripotency. **Hans Schöler** (Max Plank Institute for Molecular Biomedicine, Germany) isolated unipotent male murine germline stem cells and by altering culture conditions were able to produce pluripotent ES-like cells. He compared this method to the recently published work of Shinya Yamanaka (Kyoto University, Japan) where fibroblasts were reprogrammed by nuclear transfection with 4 factors known to contribute to self-renewal in genuine mES

cells. Additionally he highlighted a decrease in methylation on culturing these ES-like cells and suggested that this process may be required for reprogramming and regain of pluripotency.

Pierre Savatier (INSERM, France) used an inducible expression system to show STAT3 regulation of re-entry into the cell cycle following inactivity. Identification of genes up-regulated following STAT3 induction or Nanog induction revealed 20 common genes which were shown to contribute to growth regulation or inhibition of differentiation.

Having identified phosphoinositide 3-kinase (PI3K) as a regulator of self-renewal and Nanog expression in mES cells, **Melanie Welham** (University of Bath) described the work of her group in using Affymetrix expression profiling to identify the PI3K-dependent transcriptome in mES cells. Down regulated genes following pharmacological inhibition of PI3Ks included Nanog and a family of zinc finger proteins.

Hélén Boeuf (University of Bordeaux, France) continued the self-renewal theme by presenting the findings of transcriptome analysis of pluripotent, committed and early differentiated cells in the presence or absence of LIF (Leukemia Inhibitory Factor). Using this approach clusters of genes were identified following removal of LIF from pluripotent cells that may, following further investigation, be novel pluripotent markers. Moreover, genes with expression changes following removal or addition of LIF when cells are in a committed or early differentiated state provide insight into the plasticity of ES cells.

Mesoderm

Nadia Rosenthal (EMBL-Monterotondo Outstation, Italy) presented some interesting data on the role of macrophages in muscle tissue repair. The M1 class of macrophages are pro-inflammatory and migrate into damaged tissue, while M2 macrophages are anti-inflammatory and require transcription dependant on the C/EBPb transcription factor complex for polarisation and activation. By blocking C/EBPb dependant transcription polarisation of the M2 phenotype macrophages was blocked and the M1 macrophages persist, this resulted in impaired tissue repair. This study provides the first genetic link between polarisation of macrophages and muscle tissue regeneration.

Given the current obesity crisis it is important to gain a better understanding of the signalling networks that control an increase in fat cell size and number. **Cristian Dani** from Nathalie Billon's group (CNRS, France) treated mES cells with an enhancer (Retinoic acid receptor B activator) and an inhibitor (GSK3 inhibitor, Bio) of adipogenisis during embryoid body development to identify potential adipogenisis enhancers and inhibitors by microarray analysis. **Nathalie Billon** (CNRS, Nice, France) presented novel insights to the origin of adipocytes from neural crest cells during normal development and in mES cell based cultures. This work demonstrated that neurectoderm rather than mesoderm, as previously thought, can give rise to adipocytes. During normal mouse development, neural crest cells produce a population of adipocytes in the head region.

Kenneth Chien's (Massachusetts General Hospital, USA) group have implicated the Wnt/β-catenin pathway in modulation of differentiation or renewal of cardiac progenitor cells. Manipulation of the Wnt pathway was shown to cause a massive expansion in Isl1(+) progenitor cells from human neonatal hearts, which could be a significant step towards providing cells for cardiac tissue replacement. Progenitor cells were grown in a single cell layer to form a coil that tightens as the cells contract, demonstrating that these cells could function as normal tissue.

Ectoderm

Development of protocols for the generation of cells of neuronal lineage is another important and active area of research. Domingos Henrique (Instituto Medicina Molecular, Portugal) spoke about a new protocol for the derivation of neural progenitor cells from ES cells in a monolayer culture system; these cells can form structures that resemble neural tubes. This new protocol is simple, compared to traditional embryoid body based protocols, and produces neuronal progenitors that have close parallels to *in vivo* neurogenisis.

Kate Storey (University of Dundee) presented observations of stem cells in the tail bud region of mouse embryos. Fibroblast growth factor (Fgf) signalling was reported to be important in maintaining cells in this region, with the signal declining during neuronal differentiation. Retenoic acid (RA) was found to attenuate a decline in Fgf signalling and promote neuronal differentiation.

Oliver Brüstle (University of Bonn, Germany) presented data on human ES cell derived neural stem cells. Culture conditions have been optimised to arrest hES cells in a neuronal stem cell stage, resulting in a population of cells that undergo maturation and even synaptic integration when transplanted in vivo. Genetic analysis has revealed that extended culture in FGF2 and EGF results in a population of cells that express markers of the hindbrain, however, these cells are still plastic enough to be directed to along a spinal cord or dopaminergic midbrain fate. The long term self-renewal and high degree of plasticity of these neural stem cells could provide insight for the generation of cells for neural replacement.

Endoderm

Multipotent pancreatic progenitor cells are of particular interest since they produce insulin-secreting beta cells. These cells have the potential to be used as a therapy for diabetes with many research groups currently investigating this possibility. During the final session, **Mark Magnuson** (Vanderbilt University Medical Centre, USA) demonstrated the work of his group in characterising Ptf1a expressing multipotential pancreatic progenitor cells and Pdx1 expressing cells that form foregut endoderm of the developing embryo. The absence of Ptf1a caused a decrease in the number of beta cells produced. Similarly, **Anna Wobus** (Max-Delbrück Centre for Molecular Medicine, Germany) explained that ES cell-derived insulin secreting cells are limited in their potential to treat diabetes as they represent embryonic or foetal developmental stage cells. Pax4 over expressing cells were shown to differentiate into functional insulin secreting cells of a higher maturational level that may be more suitable for therapeutic use.

The plasticity of differentiating ES cells was revisited by **Mary Weiss** (Institut Pasteur, France) who described the production of a cell line that exhibits the ability to participate in liver regeneration and differentiate into hepatocyte clusters with the occasional formation of bile duct structures. Lesley Forrester (University of Edinburgh) presented her combined microarray analysis and culture condition approach to characterise the genetic pathways involved in haematopoietic and hepatic lineage differentiation

Summary

The FunGenES meeting proved to be particularly interesting. It showcased the research achievements of the consortium and demonstrated new bio-informatics tools that have been developed. These tools will soon be in the public domain and be made available for other groups to use as online resources for the analysis of mouse micro array data. It is hoped that these tools will be the legacy of the consortium and will facilitate further research in the area of ES cell self-renewal and differentiation.

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OARSI World Congress on Osteoarthritis

6–9 December, 2007. Fort Lauderdale, Florida

The annual congress of the Osteoarthritis Research Society International (OARSI) was held in warm Fort Lauderdale with its long sandy beaches and palm trees. The conference organisers gave us the opportunity to enjoy the setting by offering early morning beach activities including Tai Chi and yoga. However, within the conference venue a supply of good coffee helped to focus the mind on things scientific.

The OARSI congress is an international meeting for anyone involved in osteoarthritis research or treatment, so it is a forum for both clinical and basic science interests. It was my first OARSI congress and I thought the meeting was superbly organised with five plenary sessions and eleven concurrent sessions.

The meeting commenced with two plenary sessions devoted to the pathology of pain in osteoarthritis (OA). The data presented by **Stephen McMahon** (King's College London) in the first plenary session highlighted the importance of understanding pain in OA. He showed how pain sensitivity varies enormously across the population. This variability in pain perception can be influenced by genetic factors. For example, loss and gain of function mutations in the peripheral neurone sodium channel Nav 1.7 can lead to extreme cases of pain insensitivity and sensitivity respectively. Professor McMahon underscored how radiographic changes in OA correlate poorly with the degree of pain experienced by patients. Therefore, it will be important to identify causes of pain sensitivity in OA.

Hideaki Nagase (Kennedy Institute, London) delivered the keynote lecture on targeting MMPs (matrix metalloproteinases) and the ADAMTS (A Disintegrin And Metalloproteinase with Thrombospondin motif) proteinases in OA. Enzymes in these families are responsible for degradation of the cartilage extracellular matrix, but pharmacological chelation of the zinc ion required at their common active site causes unwanted side effects. The Nagase laboratory has used a mutagenesis approach to investigate the function of the non-catalytic domains of MMP1 (which can degrade collagen) and ADAMTS4 and ADAMTS5 (which can degrade aggrecan). In MMP1, the non-catalytic hemopexin domain assists local unwinding of collagen before cleavage, while the non-catalytic domains of ADAMTS4 and ADAMTS5 are involved in binding to their substrate aggrecan. Therefore, the actions of the non-catalytic domains could be new targets for specific enzyme inhibition. One anti-arthritic agent that could provide such selective inhibition is calcium pentosan polysulphate (CaPPS). Professor Nagase presented the three modes of CaPPS action against ADAMTS4 and ADAMTS5 activity 1) binding to the ADAMTS4 and ADAMTS5 non-catalytic domains and preventing their interaction with aggrecan 2) prevention of internalization of their native inhibitor TIMP3 and 3) enhancement of TIMP3 activity.

Getting up early for the breakfast workshops was well worth it. I particularly enjoyed the workshop focused on the culture on human chondrocytes and chondrocytic cell lines lead by **Mary Goldring** (Hospital for Special Surgery, New York). Chondrocytes are the cells that reside within cartilage and are responsible for production and secretion of cartilage matrix molecules. Adult chondrocytes are quiescent, have low synthetic activity and live in hypoxic conditions because of the lack of blood supply in cartilage. It is notoriously difficult to encourage primary chondrocytes to maintain their phenotype after isolation and growth *in vitro*. Professor Goldring highlighted how experimental results can be affected by variability in primary chondrocyte cultures due to time in culture and loss of phenotype, as well as that due to donor age, disease status and treatment. Professor Goldring and others have generated immortalised chondrocytic cell lines that are easier to maintain in culture, can be grown in high volumes and are utilised in many laboratories across the world. However, immortalised chondrocytes still have a different phenotype to primary chondrocytes. Professor Goldring suggested ways we can slow the growth of immortalised chondrocytes to encourage them to produce more matrix and revert to a more chondrocytic phenotype (e.g. by using defined culture medium or growth in 3D culture). However, she also stressed the importance of validating studies in primary chondrocytes, cartilage tissue sections and in vivo models.

The third plenary session was a collection of talks from the most highly rated abstracts submitted to the conference. Some of the authors of the 436 posters on display at the meeting were selected for presentation in this plenary session or in the concurrent sessions, reflecting the exciting research the conference had attracted. The data presented on WISP-1 by **Arjen Blom** (Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands) was of particular interest to me. Dr. Blom has found that expression of WISP-1 (Wnt1 Inducible secreted protein 1) mRNA is up-regulated in two mouse models of OA. Furthermore, WISP-1 mRNA and protein are up-regulated in human OA cartilage and synovium compared to post-mortem controls. When murine macrophages are treated with recombinant WISP-1 protein, expression of the metalloproteinases MMP3, MMP9 and MMP13 are significantly increased. MMP3 is also up-regulated when murine chondrocytes are treated with WISP1. He also reported that in preliminary studies, adenoviral infection of the WISP-1 gene into mouse knee joints leads to an increase in MMP3 and MMP13 protein and production of MMP and ADAMTS derived aggrecan cleavage fragments. These data suggested that WISP-1 may have a catabolic role in OA.

The concurrent sessions covered a wide variety of topics including the role of bone disease, inflammation and innate immunity and ageing in OA. I particularly enjoyed a session on new insights into mechanotransduction in cartilage. **Martin Knight** (Queen Mary University of London) began the session. He presented data on the

expression of Connexin 43 in cartilage and in relation to chondrocyte primary cilia. In some cells cilia movement is known to trigger mechanosensory pathways by initiating intracellular calcium signalling. Chondrocytes have a single primary cilium that extends into their pericellular matrix and is thought to be involved in mechanosensing. Connexin 43 is a gap junction protein and it responds to mechanical strain in various cell types by triggering extracellular ATP release. Martin Knight used fluorescence imaging to show that chondrocytes in bovine and human articular cartilage had cilia and in some areas Connexin 43 hemichannels decorated the primary cilia. In human articular cartilage, chondrocytes in the superficial zone (closest to the cartilage surface) expressed Connexin 43. The purine receptor P2Y2 was also localized to the superficial zone. Purine receptors activate intracellular calcium in response to extracellular ATP. Therefore, the expression of Connexin 43 by chondrocytes suggests it could contribute to mechanosensing in cartilage and the purine receptor P2Y2 would be present to evoke an intracellular calcium response after Connexion 43 activation.

Donald Salter (Edinburgh University) continued on the mechanoreceptor theme in his presentation on NMDAR signalling in chondrocytes. NMDARs are heterooligomeric glutamine gated ion channels that allow influx of Na^{2+} or Ca^{2+} into cells. The name NMDAR derives from the discovery that they respond to the artificial amino acid N-methyl-D-aspartate (NMDA, which is an analogue of glutamate). NMDARs have a role in the regulation of synaptic function in the central nervous system, but they may have potential roles in osteoclastogenesis and mechanosensing. Dr. Salter used immunohistochemistry, western blotting and RT-PCR to show that human articular chondrocytes express the NR1, NR2A and NR2B subunits of NMDARs. Addition of NMDA with glycine to chondrocytes increased intracellular calcium levels and this response was blocked by antagonists of NMDARs. However, he showed that normal and OA chondrocytes have different responses to NMDA. Normal chondrocytes hyperpolarised, while OA chondrocytes depolarised. These responses were maintained when human knee chondrocytes were grown in monolayer culture then mechanically stimulated, and could be inhibited using NMDAR antagonists. In neurones normal levels of NMDAR signalling promote cell survival, but chronic stimulation of NMDAR signalling leads to cell death. The difference in NMDAR signalling in OA and normal chondrocytes may affect chondrocyte survival in response to mechanical stimulation and impact on OA progression. However, this remains to be elucidated and has opened up paths for exciting new research.

Tonia Vincent (Kennedy Institute of Rheumatology, London) presented exciting new research continuing her story on the response of cartilage to mechanical injury and loading. After the discovery that FGF2 was the soluble factor responsible for Erk phosphorylation in response to cartilage injury or loading, her research has also demonstrated that FGF2 is present in the chondrocyte pericellular matrix and co-localises with the pericellular heparin sulphate proteoglycan perlecan. In addition to this, Dr. Vincent presented data showing that FGF2 knockout mice have significantly accelerated cartilage loss and a superinduction of ADAMTS5 (the key ADAMTS in cartilage degradation) in response too surgically induced OA. Also, FGF2 could oppose induction of ADAMTS5 expression in hip cartilage explants treated with the cytokine interleukin-1 (IL-1). Therefore, FGF2 may have an important protective role against aggrecan breakdown in cartilage.

Finally, this meeting gave me a valuable opportunity to present data from my PhD studies into the role of Wnt1 Inducible Secreted Protein 3 (WISP-3) in osteoarthritis and chondrocyte biology. I would like to thank the BSCB for the Honor Fell Travel Award which helped me to attend this exciting meeting.

Natasha Baker
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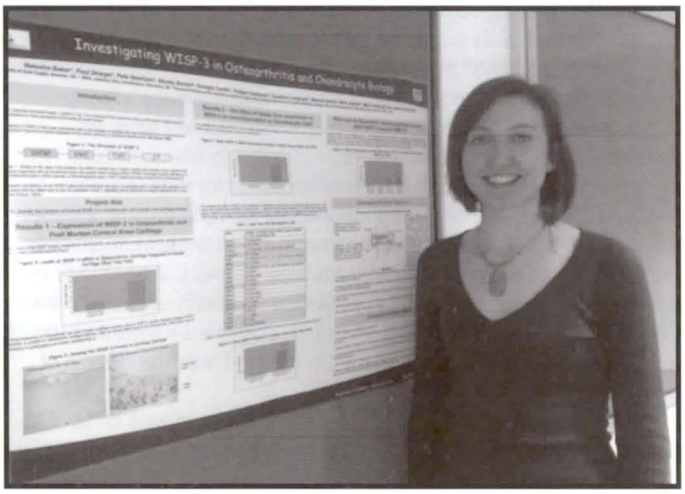

Actin 2007

10 December 2007. The Watershed, Bristol

Following the success of Actin 2006, on 10 December 2007 around 130 members of the UK 'Actin Community' returned to the Watershed, a cinema complex overlooking the floating harbour in Bristol, for the second one-day Actin meeting.

The event, organised by Harry Mellor and Giles Cory, comprised of 12 short talks given by postdocs and students followed by questions. Actin 2007 also saw the inclusion of a poster session over lunch that generated many useful discussions and opportunities for networking.

Tayamika Mseka, from Louise Cramer's lab (LMCB, London) started the opening session with an interesting story about the role of ADF/Cofilin in the formation of cell polarity. She showed that the formation of polarised actin bundles in the cell body occurs before cell polarisation and requires ADF/Cofilin actin-severing activity.

Danielle Pearl, from ICR in London, described her work on determining the structure of troponin in the thin filament using novel image processing methods. Combining data from thousands of electron-micrographs of troponin bound to actin, and using a series of image processing techniques, she was able to obtain an electron density map of troponin bound to the thin filament. What made the study really interesting was that when the structure of troponin was modelled into this electron density map, Danielle showed that the orientation of troponin along the actin filament was the reverse of that generally accepted by the field.

Following a short break for coffee, the meeting moved on to a series of talks dealing with cell invasion. **Mehreen Zaki**, from Rob Insall's lab at the Beatson Institute, ably demonstrated the power of Dictyostelium as a model system and discussed her work on the Arp2/3 complex using $Arp2^{+/-}$ mutants that show a diminished phototactic response. Patrick Caswell, from Jim Norman's lab (Beatson Institute), talked about his work on Rab25 which promotes the 3D-invasion of A2780 cells into fibronectin-containing matrix by increased directionality and the extension of more psuedopods. Within the pseudopod, Rab25 sets up a localised endocytic system to recycle $\alpha5\beta1$ at the pseudopod tip. Finally, in the last talk before lunch, **Cedric Gagglioli**, from Erik Sahai's lab (LRI), showed that the collective invasion of carcinoma cells into a collagen and lamin matrix is led by fibroblasts. Fibroblasts invade the matrix in an MMP dependent manner but remodel the matrix in a Rho-ROCK dependent manner. The subsequent invasion of carcinoma cells requires Cdc42/MRCK activity and is dependent on the tracks formed by fibroblast-mediated matrix remodelling.

After the buffet lunch, during which there was opportunity to view the posters and share useful discussions, the talks restarted with **Jonathan Astin**'s study from Kate Nobes' lab (Bristol) into the loss of contact inhibition in prostate cancer. Using PC3 cells which show high levels of invasion, Jonathan showed that contact inhibition occurs between PC3 cells but not when they contact another cell type such as fibroblasts. He proposed that there may be a role for ephrins in this process. Continuing on the theme of cell migration in prostate cancer, **Ferran Valderrama** (Anne Ridley's lab, King's College, London) presented a screen to examine the role of ERM proteins in motility and invasion and showed that loss of Radixin, Ezrin or Moesin leads to impaired mobility, with Radixin loss having the most severe effect.

Yukako Asano from Buzz Baum's lab (LMCB, London) returned to the subject of cell polarity and showed that *Drosophila* Pak3 negatively regulates Rac-induced actin polymerisation. RNAi against Pak3 caused cells to round up, actin to be mislocalised, and promoted an increase in cell motility. This phenotype can be rescued with RNAi against Cdc42 but not with RNAi against Rac1 or Scar.

The meeting then ended with three talks dealing with the WASP complex. **Dale Moulding** from Adrian Thrasher's group (Institute of Child Health, London), showed that activating mutations in WASP led to defects in mitosis and cytokinesis. Expression of the WASP I294T mutant led to increased F-actin content, asymmetric cell division, increased tetraploidy, and more micronuclei. Mitosis was also delayed and even though the cleavage furrow forms during cytokinesis, cells fail to undergo abscission and division is not completed. Secondly, **Ina Weisswange** from Michael Way's lab (LRI) discussed her work on the formation and dynamics of the Nck/WIP/N-WASP/Grb2 complex with the Vaccina virus. She showed that Grb2 is not necessary for complex formation or actin polymerising activity but that it does have a role in stabilising the complex. In the absence of N-WASP, Nck is recruited to the complex but Grb2 and WIP are not, and actin polymerising activity is absent, demonstrating that complex formation is a highly ordered and regulated process. Finally, **Austen Worth** from the Institute of Child Health discussed his work on the clinical WASP mutations A134T, R138P, R86H and T45M that bind Cdc42 but not WIP.

The day ended with a drinks reception and prize giving. Mark Thorne from *Biochemical Journal* presented a Young Investigator Award to **Alistair Robertson** from Kathryn Ayscough's lab for a poster on his work on actin dynamics in yeast. I was delighted to be awarded the meeting prize for my talk on MST1/2 and signalling in cytoskeletal integrity – although as all the Beatson people had to rush for their flight home to Glasgow I didn't find out until the next day!

Finally, Actin 2007 would not have been possible without generous support from a number of sponsors. Dharmacon (Thermo-Fisher) and Zeiss microscopes continued their sponsorship from last year and were joined by Cell Signalling Technologies and Ibidi (Thistle) along with the Biochemical Journal. The BSCB made a significant contribution to supporting the meeting, which allowed Harry and Giles to keep the registration low. This allowed whole labs to attend and definitely contributed to the spirit of the day.

All in all the meeting was a great opportunity to share the latest research coming out from the top Actin labs in the UK and to put actin firmly where it belongs at the centre of cell biology!

Ruth Densham, Beatson Institute for Cancer Research, Glasgow

Forthcoming BSCB meetings

BSCB Autumn Meeting 2008: Epithelial morphogenesis and diseases

8–10 September 2008, University of Greenwich, London, UK

The BSCB Autumn Meeting 2008 is being organized by Vania Braga and Charles Streuli on 'Epithelial Morphogenesis and Diseases'. The idea is to provide a forum for discussion of recent topics that are relevant to epithelial function ranging from differentiation to disease. The meeting will gather participants from UK, EU and USA in the fields of epithelial patterning, polarity, adhesion, stem cells, cancer and other diseases.

The breadth of topics at the leading edge of epithelial research and the international experts invited will provide an exciting framework for stimulating discussions.

The meeting will be housed at the University of Greenwich, a World Heritage site by the River Thames in London. The university's largest campus is centered on three baroque buildings designed by Sir Christopher Wren at the end of the 17th century. The University of Greenwich beautiful campus is completed by London's finest Royal Park, the historical buildings of the National Maritime Museum and the 17th-century Royal Observatory that indicates the spot from which Greenwich Mean Time is calculated.

The University of Greenwich will provide a secluded site and relaxing time for the participants. Yet, the campus is very close to central London and amenities.

Sessions

Stem Cells
Tissue Specificity
Patterning
Morphogenesis
Cell-cell adhesion
Polarity
Epithelial Cancer
Epithelial Diseases/Differentiation

Confirmed Speakers

Matthew Smalley – Institute of Cancer Research, UK
Andrea McClatchley - Harvard Medical School, USA
Margaret Frame – University of Edinburgh, UK
Frank McKeon - Harvard Medical School, USA
Denis Headon - University of Manchester, UK
Ken Yamada - National Institutes of Health, USA
David Tuveson - Cambridge Research Institute, UK
Keith Mostov - University of California, USA
Vania Braga – Imperial College London, UK
Senthil Muthuswamy - Cold Spring Harbor, USA
Jean Paul Borg – INSERM Institute, France
Marco Pontoglio – Pasteur Institute, France
Stephen Holgate - University of Southampton, UK

ADVANCED NOTICE – BSCB Spring 2009 meeting

The Dynamic Cell

A joint Biochemical Society and British Society for Cell Biology meeting

1–4 April 2009 at Appleton Towers, University of Edinburgh, UK

Programme Committee:

BSCB
Margarete Heck (Edinburgh)
Andrew McAinsh (MCRI,UK)

Biochemical Society
Robert Insall (Beatson Inst., Glasgow)
Barbara Reaves (Bath)

Please put these dates in your diary

Other forthcoming meetings

2008

The Genetics Society Spring Meeting: Frontiers in Epigenetics
John Innes Centre, Norwich
10th May 2008
www.genetics.org.uk/

Gordon Conference Molecular Cell Biology
June 1-6, 2008
Colby-Sawyer College, New London, NH, USA
www.grc.org/programs.aspx?year=2008&program=moleccell

Gordon Conference: Lysosomes & Endocytosis
June 22-27, 2008
Proctor Academy, Andover, NH, USA
http://www.grc.org/programs.aspx?year=2008&program=lysosomes

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

Microscience 2008
London, UK
23 – 26 June
www.microscience2008.org.uk

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

Young Scientist Forum-FEBS 2008 Cell Harmony
Loutraki, Greece
26-28 June 2008
/www.febs-iubmb-2008.org/

Metal metabolism: transport, development and neurodegeneration
9th – 10th July 2008
Imperial College London
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA078

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

ESCRTs – from cell biology to pathogenesis
Robinson College, Cambridge, UK
26th – 28th August 2008
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA090

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

The Golgi meeting: membrane trafficking in global cellular responses
4th -9th September 2008
Pavia, Italy
www.febs.org/index.php?id=105

mTOR signalling, nutrients and disease
Medical Sciences Teaching Centre, University of Oxford
15th – 16th September 2008
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA086

Kidstem international conference - The Kidney: Development, Repair & Regeneration
Carnatic Conference Park
17th – 10th September 2008
Carnatic Conference Park, Liverpool
www.postgenomeconsortium.com/kidstem/flyer.html

Cell-cell communication in plant reproduction
Rothamsted Research, Harpenden, UK
18 - 19 September 2008
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA087

Neuronal glutamate and GABA receptor function in health and disease
St Andrews University, UK
21 - 24 July 2009
www.biochemistry.org/meetings/programme.cfm?Meeting_No=SA082

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

2009

ELSO
September 2009
Amsterdam, Netherlands
www.elso.org

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

2010

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

ELSO
September 2010
Dresden, Germany
www.elso.org

2011

ELSO
September 2011
Amsterdam, Netherlands
www.elso.org

The American Society for Cell Biology

48th Annual Meeting

December 13–17, 2008 • San Francisco

Don't miss...

Cutting-edge Symposia that Illuminate Hot Topics

- Cell Biology of the Senses
- Cell Migration and Metastasis
- Nuclear Organization and Disease
- Models for Stem Cell Biology

Working Groups that Spotlight Questions, Chart Directions

- Dynamic Nature of the Nucleoplasm
- Impacts of Stem Cell Research on Cell Biology
- Cellular Basis for Motor Neuron Degeneration

...And much more!

Important Deadlines

Regular Abstract Deadline – August 7
(for minisymposium talk OR poster consideration)

Regular Abstract Deadline – September 3
(for poster consideration ONLY)

Early Registration Deadline – October 7

Late Abstract Deadline – October 16

www.ascb.org

ICCB 2008
International Congress on Cell Biology

The 9th International Congress on Cell Biology

In conjunction with the 20th Annual Meeting of The Korean Society for Molecular and Cellular Biology

Challenge of Life Sciences: *Molecules and Cells*

October 7(Tue) ~ 10(Fri), 2008

Coex, Seoul, Korea

www.iccb2008.org

Hosted by
The Korean Society for Molecular and Cellular Biology

Sponsored by
International Federation for Cell Biology

Important Dates

June 30, 2008 Abstract Submission
August 31, 2008 Advance Registration
August 31, 2008 BioClips Submission

ICCB2008 Secretariat :
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KSMCB Secretariant :
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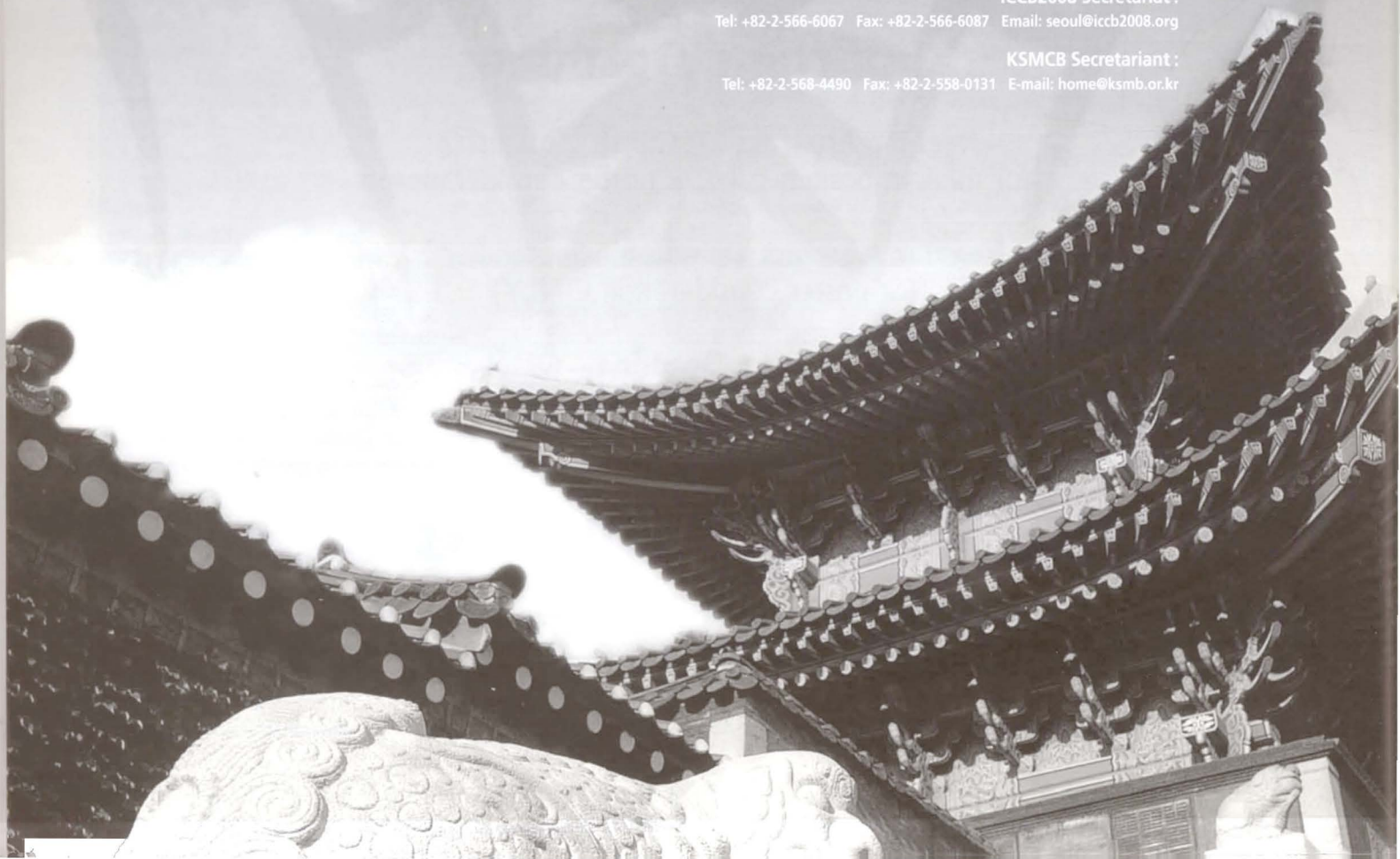

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Jointly funded by the BSCB and the Company of Biologists

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.
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- 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.**

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Full name and Mailing address:

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Number of Meetings attended last year:

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

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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.

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Name: _____

Applicant

Signature: _____

Name: _____

2nd International Symposium on Cellular Delivery of Therapeutic Macromolecules

Cardiff University, UK
22 – 25 June 2008

Registration Deadline
24th April 2008

Abstract Deadline
20th March 2008

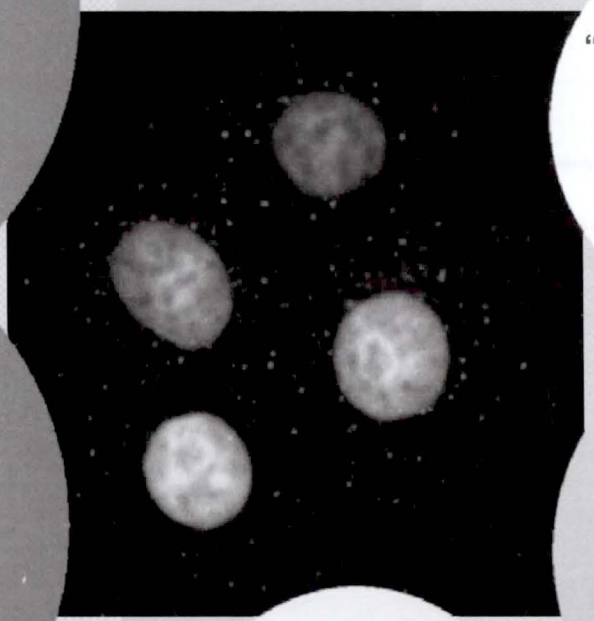
Registration and further details can be found at
www.CDTM2008.cardiff.ac.uk

Confirmed Speakers

Bert de Boer (Netherlands)
Isabelle Fajac (Fr)
Shiroh Futaki (Japan)
Mike Gait (UK)
Dick Hoekstra (Netherlands)
Ludger Johannes (Fr)
Jørgen Kjems (DEN)
Jindrich Kopecek (USA)
Wayne Lencer (USA)
Randy Mrsny (UK)
Ben Nichols (UK)
Len Seymour (UK)
Jan Schnitzer (USA)
John Silvius (Canada)
Ernst Wagner (Germany)

Applications Sessions

Kevin Braeckman (Belgium)
Aled Clayton (UK)
Peter Griffiths (UK)



Poster Sessions
sponsored by **Elsevier** "**Drug Discovery Today**" & "**Advanced Drug Delivery Reviews**" Prizes covering registration (£175) & Journal subscriptions

Discussants

Ruth Duncan (UK)
Bernard Lebleu (Fra)
Peter Watson (UK)

Organisers

Mark Gumbleton
(Cardiff University UK)
Arwyn Jones
(Cardiff University UK)

Topics to include:

- **Endocytosis and Membrane micodomains**
- **Polyplexes and cellular barriers**
- **Gene delivery for cancer therapeutics**
- **Cellular dynamics of cell penetrating peptides**
- **siRNA technologies**
- **Cellular uptake and trafficking of Toxins**
- **Antibody transport across biological barriers**
- **Transcytosis & macromolecular drug delivery**
- **Macromoleular drug Transport through the Blood Brain Barrier**
- **Polymer Therapeutics**
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The Society has representatives at each of the institutions listed below. The Ambassadors have agreed to promote Society activities and membership within their University or Institute.
They disseminate advertisements concerning future BSCB meetings, promote the advantages of membership, particularly to new PhD students, and are available to sign application forms and answer any BSCB-related questions. If your institute is not represented and you would be willing to become and ambassador, please contact Jonathan Pines.

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

It is preferable to send all articles, reports and images by e-mail (though alternatives can be arranged after contacting the editor).

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

Submission of articles and images should be made to

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

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

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Postmaster and General Inquiries

Send changes of address, amendments and general queries to:

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Developmental Dynamics	$125	$165
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Journal of Cellular Biochemistry	$350	*
Journal of Morphology	$175	*
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* No standard individual rate available; only available to institutions

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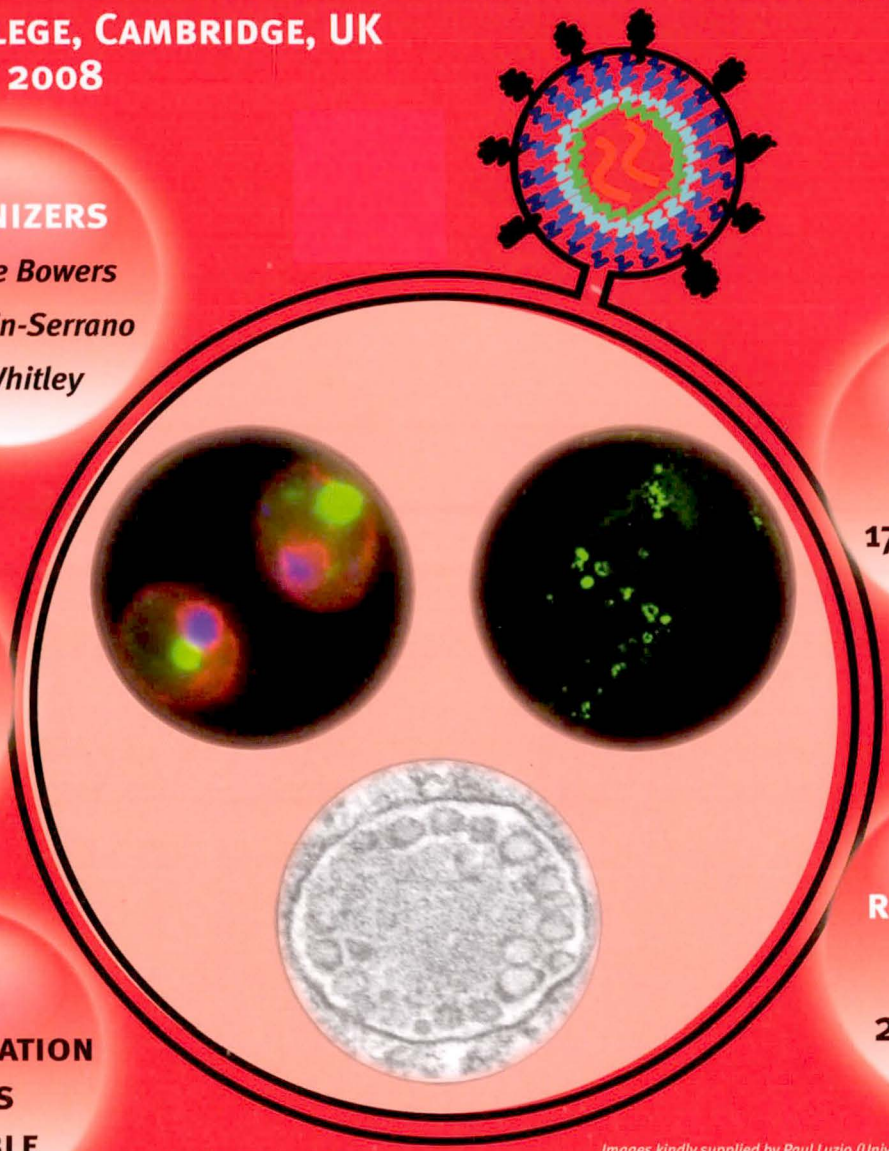
ROBINSON COLLEGE, CAMBRIDGE, UK
26–28 AUGUST 2008



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POSTER ABSTRACT DEADLINE

17 June 2008

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EARLYBIRD REGISTRATION DEADLINE

26 July 2008

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Greg Odorizzi
Harald Stenmark
Heinrich Gottlinger
Jean Gruenberg
Mark Marsh
Paul Bieniasz
Paul Luzio
Roger Williams
Scott Emr
Wesley Sundquist
Winfried Weissenhorn

TOPICS TO INCLUDE

- *AAA-ATPases and ESCRTs*
- *ESCRTs and endosomal sorting*
- *HIV and ESCRTs*
- *Melanosomes and ESCRTs*
- *Structure of ESCRT complexes*

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