SPRING 2011

BSCB Newsletter

BRITISH SOCIETY FOR CELL BIOLOGY

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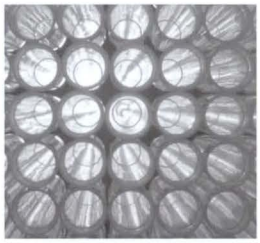
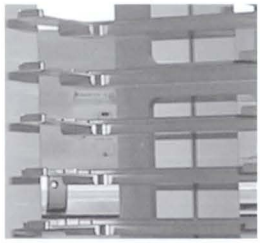
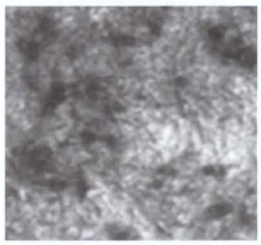
SPRING 2011

BSCB Newsletter

CONTENTS





Editorial

Welcome to the Spring 2011 issue of the BSCB newsletter. Publication this year coincides with the Spring meeting in Kent – a joint meeting with the BSDB and the meeting has a strong focus on cell signalling, cell adhesion, cell dynamics and morphogenesis. The speaker list, husband aside, is fabulous and I hope to see you there. The Autumn meeting this year will take place in Liverpool and is all about ubiquitin-dependent degradation pathways. This meeting also has a great list of international speakers as well as short talk presentations that will be selected from poster and abstract submissions.

I hope you enjoy reading this issue – it includes a selection of reports written by students awarded BSCB summer. I love reading these reports because the students are so very enthusiastic about their experiences – the scheme will be running again this year and the deadline for the next tranche of summer studentships is 30 April, 2011 (see www.bscb.org for details). Also, you will find inside the usual meeting reports – my favourite is the one written by Simon Fellgett from the University of York; his balcony poster presentation scene had me on the edge of my seat! One of the feature articles is the wonderful essay "What makes us tick" by the winner of our Science Writing Competition, Jon Ankers, who will be awarded his prize at the Spring meeting. I am also pleased to remind you of the BSCB Image competition and the closing date for entries of 30 June – remember the winning entries get displayed on the cover of this newsletter and the prize money is more than enough for several drinks!

The Spring meeting in Kent marks the exit of two key members of the BSCB committee - Clare Isacke who has been our President and Liz Smythe who has been Secretary, both since 2006. A collective 'thank you so much" for all your work for the BSCB from all of us. During her time as President, Clare was committed to making BSCB relevant and accessible to younger members, especially postdocs and students; postdoc and PhD representatives were co-opted onto the committee and encouraged to set up networking events which have been really successful; and she strongly supported the summer studentships scheme, which was initiated by Adrian Harwood. Liz will be very much missed too – she is always on top of things, is constantly calm, and keeps the society on the right track. There will be a change of sex bias for the top two with Jordan Raff (Oxford) as President and Grant Wheeler (Norwich) becoming our new Secretary. Also new to the committee are: Jean-Paul Vincent (NIMR), Caroline Austin (Newcastle) and Steve Royle (Liverpool). Sean Munro and Sylvie Urbé will also stand down this year and we thank them too for their work for BSCB.

The Editor: Kate Nobes
University of Bristol; catherine.nobes@bristol.ac.uk

The cover is the 2nd prize entry in the BSCB 2010 Image Competition. Helen White-Coopers's beautiful image shows *Drosophila* spermatids. Actin-rich investment cones (coloured in green but labelled with FITC-phalliodin) start at the nuclei (coloured in magenta) and progress along the spermatids, eliminating excess cytoplasm from the spermatids, to result in streamlined individual sperm. Helen is a Senior Lecturer at the University of Cardiff. The call for entries for the 2011 BSCB Image Competition is on page 3 of this issue of the newsletter and the deadline is 30th June.

Newsletter editor: Kate Nobes **Production:** Giles Newton **Website:** www.bscb.org **Printer:** Hobbs

BSCB
BRITISH SOCIETY FOR CELL BIOLOGY

Organizers: Michael Clague, Sharon Tooze, Sylvie Urbé
http://www.bscb.org

Cell Biology of Ubiquitin-Dependent Protein Degradation Pathways

11th –13th September 2011
Liverpool, UK

Autophagosomes, Lysosomes, Proteasomes

Rob Beynon (UK)
Michael Clague (UK)
Ivan Dikic (Germany)
Zevi Elazar (Israel)
Dan Finley (US)
Clare Futter (UK)
Alfred Goldberg (US)
Rosine Hagenauer-Tsapis (France)
Joerg Hoehfeld (Germany)
Thorsten Hoppe (Germany)
Terje Johansen (Norway)
David Komander (UK)
Jon Lane (UK)
Paul Lehner (UK)
Matthias Peter (Switzerland)
Simona Polo (Italy)
David Rubinsztein (UK)
David Teis (Austria)
Sharon Tooze (UK)
Allan Weissman (US)
Philip Woodman (UK)

News

Jordan Raff – new BSCB President

Jordan Raff will be taking over from Clare Isacke as President of the British Society for Cell Biology at the Spring Meeting in Kent this year. Jordan is the Milstein Professor of Molecular Cancer Biology at the Sir William Dunn School of Pathology in Oxford where the work in his laboratory focuses on centriole and centrosome function. Many of you will know Jordan either from his elegant research, as a recent member of the BSCB committee in charge of the travel awards or as a tireless advocate supporting the public understanding of science and promoting science in the UK. We all look forward to him bringing his enthusiasm and experience to this new role.

BSCB Newsletter Cover Image Competition

We are pleased to announce the second year of the BSCB image competition. Entries should illustrate cell biology in any form and the winning images will be used as cover art for the newsletter.

The closing date for entries for the 2011 competition is 30 June 2011. You must be a current member of the BSCB to enter.

Eligibility

1. This competition is open to members of the British Society for Cell Biology. Entrants must be a member at the time of submission of entries.

2. Only one entry per person is allowed.

3. The subject matter of competition entries is flexible but must reflect current research in cell biology.

Submission

1. Entrants must supply their name, address, email address, and BSCB membership number on entry.

2. Entries must be sent by email (10 x 11.96 cm 300 dpi) to Paul Andrews (pdandrews@lifesci.dundee.ac.uk).

Shortlisted entries will be requested on CD as a 600 dpi JPG saved at maximum resolution sized at 196 mm wide x 230.5mm high and in both RGB and CMYK colour modes. At the time of submission, entrants must state clearly that they are the creator of the submitted image.

3. Your entry should adopt the file name initial_surname.jpeg e.g. a_einstein.jpeg.

4. Entrants should supply a concise stand-alone caption limited to 50 words as a MS Word document on the same CD, labelled initial_surname_caption.doc.

5. The deadline for entries is 30 June 2011.

6. Entries that do not conform to the entry requirements will be disqualified.

Prizes

Prizes will be awarded as follows: 1st Prize £100, 2nd Prize £75, 3rd Prize £25

General information

1. Entries will be anonymized prior to judging.

2. The organisers reserve the right to cancel this competition at any stage, if deemed necessary in their opinion, and if circumstances arise outside their control.

3. The organisers' decisions are final in every situation and no correspondence will be entered into.

4. Entries will be published on BSCB webpages and will also be used to illustrate BSCB newsletters and other promotional material. Copyright will remain with the creator. If you do not agree that images may be used as stated you must stipulate this on the entry form.

5. Entrants will be deemed to have understood the competition rules and accepted them and agree to be bound to them when entering the competition.

Schools News

The Student as Client: Tuition Fees

The Government has decided to charge students' fees for the tuition they receive at universities or colleges in England, Wales and Northern Ireland.

(In Wales, N. Ireland and in Scotland 'local conditions' will apply. In Scotland, for example, it is suggested that students who were resident in Scotland as pupils will not have to pay tuition fees at Scottish Universities, but students from England attending institutions in Scotland will have to pay £6000 plus per year, for tuition. It appears too that pupils from homes/schools in Wales will have their tuition fees paid for them.)

Key points and some comments:

• **February 2011**. From about this date, university and college prospectuses will probably start listing course tuition fees for the student intake in September/ October 2012. Institutions are able to charge different rates for tuition fees for different courses. [If writing a prospectus, do not 'advertise' what you may not be able to deliver. You may be called to account by the student or their parents].

• **September 2012**. The system of charging tuition fees starts in England and with possible charging variations in Wales and Northern Ireland. (Students from homes in Scotland attending Universities in Scotland will probably not have to pay tuition fees). The new fee system will only apply to students starting their first course in September 2012.

• Universities and colleges can set fees for tuition up to and including a figure of £6000 per year and possibly up to a maximum of £9000

• Institutions wishing to charge between £6000 and the upper limit of £9000 will have to demonstrate that they are involved in 'widening participation' and 'fair access'.

• The money for tuition fees will be made available by Government through a loan to the student who will pay the university or college.

• Full-time students will be eligible for a loan.

• Part-time students will also be eligible provided this is their first degree course and that they study for 25% of 'their time'. [One assumes that this means attending and working on a recognised course for 25% of an academic working week].

• Neither full-time nor part-time students will have to pay up front.

• (Maintenance loans will continue to be available to all full time students who are eligible)

• (Students already at university will continue on the 'old system' throughout their course).

Repayment of Loan

• Students who were eligible for free school meals before university/college might be eligible for free tuition for a year or two. [More details expected in Government White paper to be published early in 2011].

• Graduates will not be required to repay any part of their tuition fee loans unless they are earning at least £21,000 pa. The threshold figure of £21,000 will be increased annually, in line with earnings, from April 2016. No 'real rate of interest' will be applied to the loan of someone earning less than the threshold figure.

• The repayment rate will be 9% of income above £21,000. An example of a repayment calculation, excluding any 'real rate of interest' is:
A graduate earning £25k/year would repay loan at 9%. This works out at £6.92 per week. Calculation: £25k (earnings) minus £21k (current threshold amount) = £4k. 9% of £4k is £360. £360 divided by 52 (weeks) is £6.92.

• A 'real rate of interest' will be charged up to a maximum rate of RPI plus 3%.

• For graduates earning above £41k, the 'real rate of interest' on the loan will be RPI plus 3%

• If earnings fall, repayments will also fall.

• Graduates in lower paid work (lower than £21k/year), or unpaid work including bringing up a family, will not be required to make a repayment contribution. (We assume this means until the person returns to work and earns over £21k, as adjusted for the appropriate year.)

• All outstanding payments will be written off after 30 years.

Important note: We hope this summary is useful. The information has been obtained and condensed from the Government website: **www.bis.gov.uk/policies/higher-education/students/student-finance** and a link from that site, and from the 'Guardian' newspaper. We have endeavoured to be accurate but neither the author nor the BSCB can be held responsible if the interpretation of some of the wording, and terms, do not quite accord with how Government and their Officers interpret it. In England the White Paper providing the detail is to be published in 2011 and further decisions are expected from Wales, N. Ireland and Scotland.

D. Archer, BSCB Schools Liaison Officer. 22.12.10

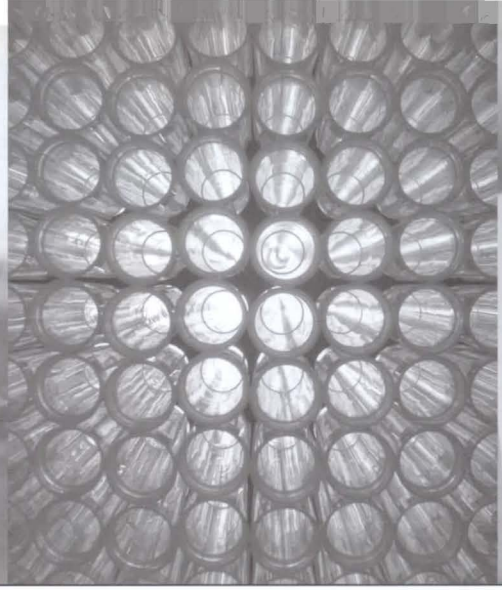
Comment as at 9 February 2011

According to recent news items, it appears that the Universities of Cambridge and Oxford have decided to charge the maximum fee allowed by Government of £9,000 per year to students taking first degree courses. It is also reported that the University of Cambridge will charge this amount for all courses.

It will now be interesting to see how other universities perceive their 'worth' in the fees hierarchy now that Oxbridge have stated what they consider to be their value to students.

What pupils/students also decide to do will be something to watch. Will we see the end of the 'gap year' between school and entry to university? Will we also witness the end of four-year first degree courses, such as those with the third year spent in industry or abroad, or those for people wanting to enter teaching?

Pupils, parents, and course and career advisers will have a lot to consider.



The Art of Science

A mouldy agar plate; a sight to wince at when opening the lab fridge, but does a photograph of this furry fiend represent the future of communicating research science to the wider community?

This image is one of twelve winners of "The Art of Science" competition, run by the University of Bristol's Faculty of Medical and Veterinary Sciences. Open to all researchers, from PhD students to their Professors, the competition was a chance for scientists to showcase new angles to their research, whilst indulging their creative instincts.

As a PhD student in the Faculty, it was apparent to me that the wealth of fantastic images collected during our day-to-day research was being lost in a void, which could not be rescued by prestigious journal covers alone. In addition, a swathe of researchers felt left out of visual communication entirely, believing Confocal Microscopy was the only answer to a call for images of public interest.

To combat this misconception and allow a space for research art to grow, we set up "The Art of Science". The entry brief for the competition is broad, the only criteria being that the image must "posses a scientific message with strong aesthetic appeal".

This year we specifically encouraged images of "life in the laboratory" and "novel interpretations" of visually inaccessible research, in an effort to uncover "the world behind the lab coat", of critical interest to non-scientists.

Alongside the beautiful electron micrographs and stacks of fluorescently stained brain slices (appearing in the research talks of current high flying academics) we cultivated a novel set of intriguing images. A DNA origami sculpture, handmade by Professor Mark Szczelkun, beautifully indicates the intricate nature of DNA folding, the focus of his research. Likewise a backlit photograph shot through a pipette rack by Dr James Hewinson is a new take on a lab favourite, highlighting the dispensable nature of research science today.

Perhaps the best of these images is the picture of mould growing on a petri dish by Dr Alexander Soloviev. This beautiful image, like flowers in a field, shows us a new perspective on this common adversary. It symbolises the nature of scientific discovery, the need to be constantly evolving and creative, to beat the blight of the failed experiment. This mould is perhaps more informative than any glossy Confocal stack to those outside our field about life in biomedical research, and such images may well be the road forward in public understanding of our research struggles and foes.

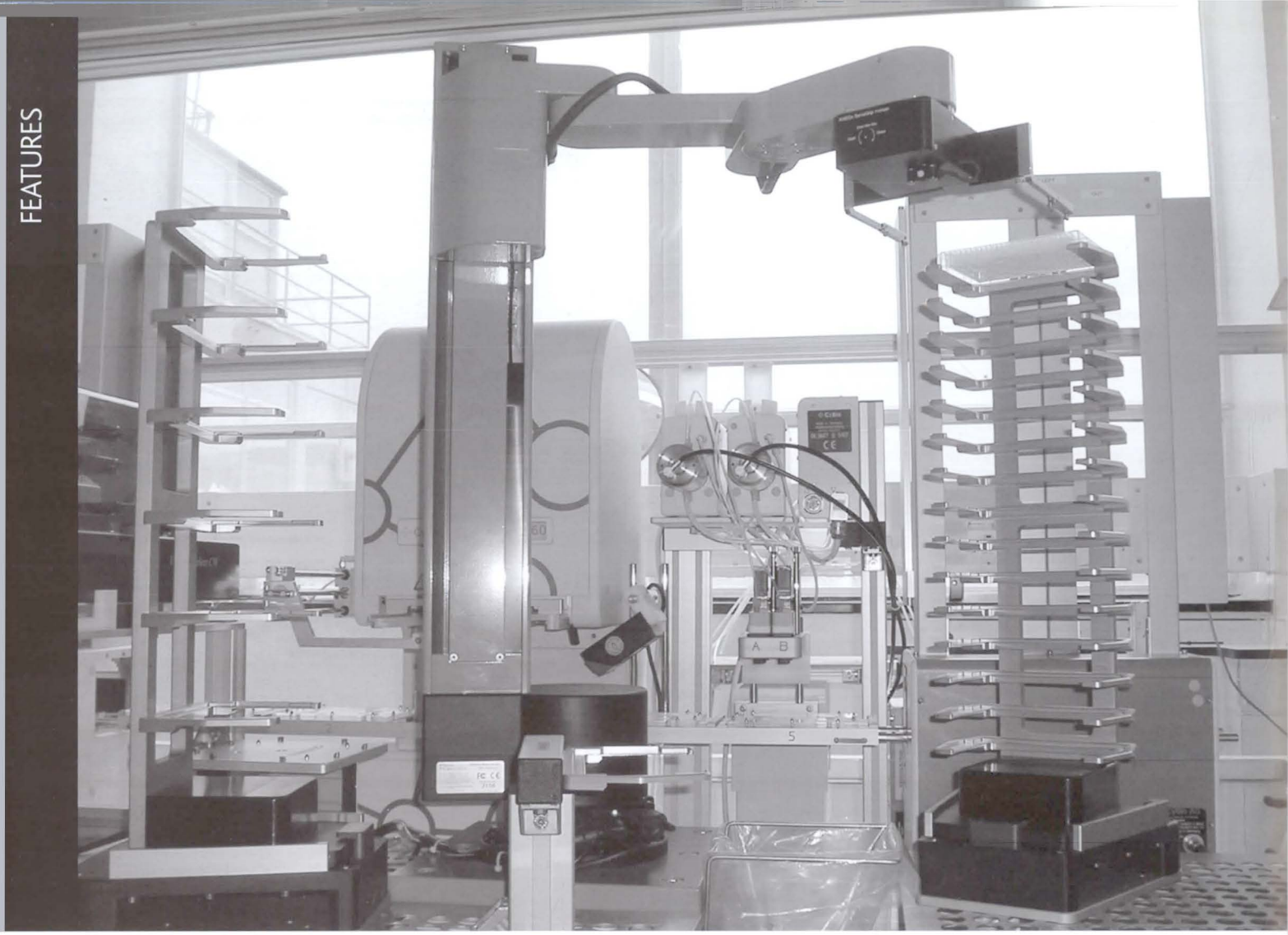
The winning images are part of a touring exhibition, which has visited The Bristol Gallery, at @Bristol café, and is now being shown at The Grant Bradley Gallery. The winning 12 images are also featured in the Telegraph Science Image Gallery, with further details available on our website www.bristol.ac.uk/fmvs/artofscience or from Rebecca.Jones@bristol.ac.uk.

Rebecca Jones, PhD Student,
Faculty of Medical and Veterinary Sciences,
University of Bristol

Above left: Mould – My Beautiful Adversary (Dr Alexander Soloviev)

Above centre: Tip Top (Dr James Hewinson)

Above right: DNA Origami (Prof. Mark Szczelkun)



The Translational Research Resource Centre, UCL

The Translational Research Resource Centre at the MRC LMCB/University College London officially opened in spring 2010 with a ribbon-cutting ceremony by the Provost of University College London, Malcolm Grant, and was followed by a keynote lecture by Professor Dr. Lucas Pelkmans, ETH Zurich. It is funded through a strategic grant from the MRC initially for three years, and now, one year later, is fully operational with multiple exciting research projects in progress.

High-throughput screening using classical and chemical genetic approaches has emerged as a powerful tool to elucidate cellular pathways, potential therapeutic targets and therapeutic lead compounds. For a long time disregarded as "fishing expeditions", it is now well accepted that genomic screening is the way forward for unexpected, ground-breaking discoveries in biomedical research. In fact, much of what we know about how cells function has come from unbiased screening approaches. This paradigm shift has been facilitated by the availability of complete genome sequences and the advent of gene-specific knockdown technology using RNA Interference (RNAi) in the early 21st century.

High-throughput screening has been a domain long occupied by the pharmaceutical industry, which mainly employed this technique for drug screening purposes. In recent years, there has also been a shift to thinking about these processes in the academic community also, leading to the establishment of several academic screening centres. One of the newest additions to this growing list is the Translational Research Resource Centre (TRRC) at the MRC LMCB in central London. The

TRRC has established itself at the forefront of novel tool development in translational research and stands out from other facilities that offer well-established biomedical screening technology.

There are three key features that make us unique in the landscape of screening facilities: Firstly, we are very flexible in assay set up and cell types we analyze at our site. The instrumentation allows analysis of various assay systems including confocal microscopy, fluorescence, absorbance, luminescence and flow cytometry. We offer small molecule, cDNA and siRNA screening libraries. Further, we work on facilitating screening in primary cells, which have been regarded as difficult in terms of transfection and handling. We have used HUVEC, Schwann cells and neuronal cells in our screening projects, and continue to develop techniques and instrumentation for primary cell screening which may ultimately lead to "*in vivo*" screening set-ups.

Secondly, the TRRC features a high-throughput screening platform for projects that involve biosafety level 3 pathogens such as Human Immunodeficiency Virus or Hepatitis Virus. This platform is located at our sister site at the Wohl Virion Centre, University College London, and uses a unique set-up of liquid handling robots (CyBio WellVario, CyBi Drop) enclosed in a biosafety cabinet, thus enabling fully automated processing of infectious samples in a 384-well format.

And thirdly, we offer solutions for image processing and statistical analysis with emphasis to develop high-content screening in 3-dimensional cultures.

The instrumentation at the TRRC includes cutting-edge technology such as:

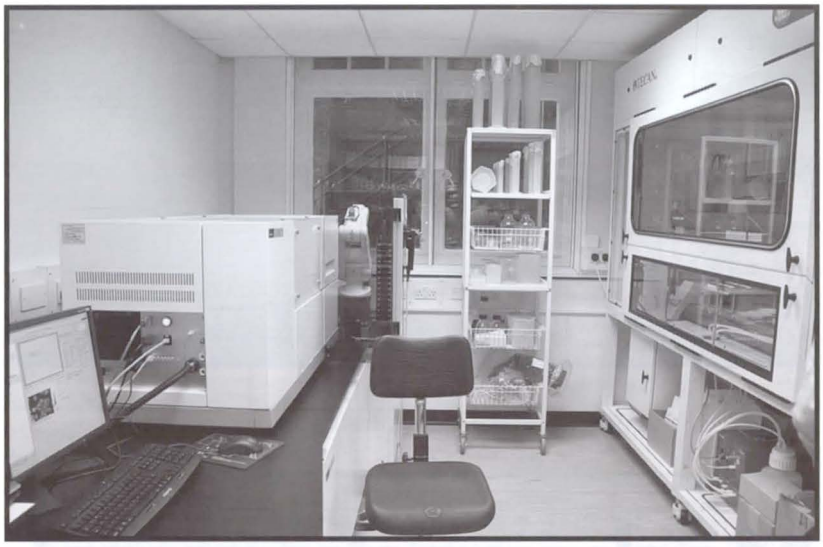
Tecan Freedom Evo - This is a lab automation workstation that is routinely used for transfection, immunostaining and sample harvesting. The instrument is equipped with a 96-channel head and an 8-span LiHa for versatile handling of plates and add-ins of control samples.

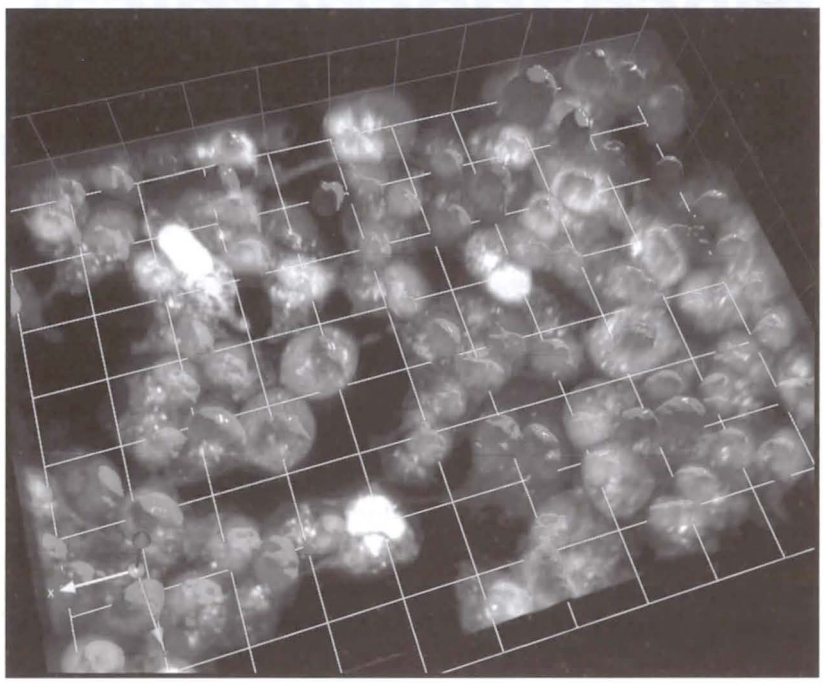
PerkinElmer Opera LX - The Opera is a confocal high-content screening microscope with three laser lines (488, 561 and 640 nm) and a UV filter for screening plates in 96- or 384-well format.

PerkinElmer Envision II - The Envision can be used for diverse assays such as luminescence, adsorption, fluorescence, and polarization. It is equipped with ultrasensitive luminescence and two injector pumps.

Hudson RapidPick/Norgren CP7200 - The Norgren CP7200 is a colony picker that is routinely used for picking and re-arraying cDNA libraries. The system is equipped with stackers to allow automated plate handling.

Labcyte Echo 520 - The Echo is an acoustic dispenser that allows touchless pipetting of extremely small volumes (2.5 nl). This instrument enables cost-effective and precise small molecule compound addition to cell and assay plates.





We routinely run most standard reporter assays, such as immunostaining, fluorescence, luciferase and morphological assays. Bioinformatic support is provided for image analysis using Acapella or IMAGEJ. For statistical analysis, we mostly use CellHTS and R package. In addition, we are developing our own image analysis tools.

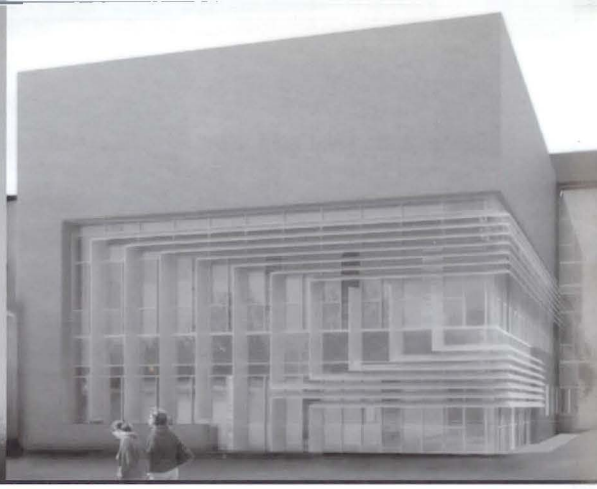
Finally, if you have the perfect assay for high-throughput screening but haven't yet embarked on a 'fishing expedition', please consider contacting Dr. Robin Ketteler (r.ketteler@ucl.ac.uk). Our management board evaluates projects on a rolling basis and we are happy to discuss with you about how we might work with you on your exciting research.

Robin Ketteler, Translational Research Resource Centre MRC LMCB, University College London

Opposite page: Liquid handling platform in the cat3 facility at the Wohl Virion Centre.

Top: The Translational Research Resource Centre with a Tecan FreedomEvo liquid handler (right side) and the PerkinElmer Opera LX high-content screening microscope (left side).

Above: 3D reconstruction image of HeLa cells.



Mechanochemical cell biology: A new centre at Warwick

Scientific institutes, like cytoskeletal microtubules, tend to grow slowly and smoothly, albeit with occasional pauses. On the whole, the pauses tend not to be worried about. But in both the world of institutes and the world of microtubules, pauses can be dangerous. In paused states, catastrophes are much more likely to happen, and explosive disassembly can rapidly ensue. Some of my scientific friends and I recently had just this happen to us, when the Marie Curie Research Institute, our base of operations for some years, paused for rather too long, catastrophized and shrank. Being microtubule-minded (you may have spotted a trend here) our response was to immediately begin searching for opportunities to start afresh.

Above left: Steelwork for the new CMCB building. Above right: computer rendered design of the new centre.

The story of our re-nucleation may be of some interest to those of you despairing about the economy, the state of British science, the unimaginative behavior of governments and the price of fish. In our own hour of need we in fact found nothing but willing, creative and constructive help, even though just about every UK institution we approached was either feeling the pinch or confidently expecting to do so. I find this very encouraging for the future. But I also think that very specific conclusions can be drawn from our experience and I am writing this to try to capture these.

A glance back though last year's *Nature*s makes it very clear that basic biomedical science in Britain, along with much of the rest of the business of invention and discovery, is in a state of revolution. All around, we see homologation, amalgamation, rationalization and focusing on key strategic deliverables, which is to say, re-organizing so as to be better able to discover and invent things.

Last year's closure of the Marie Curie Institute, a small, charitably-funded colony of scientists working in basic cancer biology, was and is a tiny blip on the spreading landscapes of British science, but for institutes both large and small, once things slow down, catastrophe and rapid shrinkage tend to follow. Like living organisms and like microtubules, scientific institutes have a natural lifetime. Institutes form up around an innovator, have, like their leadership, a heyday of productivity, and then, on the retirement of the figurehead, senesce. The destruction of the old ways frees up resources for the cycle to begin again. To fight this natural trend with the equivalent of institutional botox, liposuction and hair-transplants is probably a mistake. It is better to recognize the effect and work with it. In the Max Planck society, the Ludwig Institutes and traditionally within the MRC, it is well recognized that whilst the umbrella organization expects to endure, its component institutes have a natural life cycle.

This is the model that I think holds out great hope for science in our universities, and it is the model that we found most attractive on our recent recce of the UK labour market in basic biology. Three of my colleagues and I went looking for an opportunity to found a new institute. In several places, we saw successful institutes embedded within host universities that (in the most

favourable cases) functioned as a kind of nutrient broth. In others, we saw traditional university departments hamstrung, despite their best intentions, with a deadweight of budgetary constraints, bureacracy and politics.

When Marie Curie Cancer Care decided to close its institute, it also decided to continue to support its best science, by inviting applications for transitional programme funding. The intent was that for those of us who won this funding, the transition to a university position would be expedited. In the event, the possession of both scientific track records and transitional program grants indeed made us attractive, but the ability of institutions to respond promptly and effectively to this time-limited new opportunity depended critically on the availability of the embedded-institute model. In places where there was and is no precedent or mechanism for creating embedded institutes, our proposal to form a new centre for mechanochemical cell biology in a new building was met with quizzical smiles and patient offers of conventional positions in conventional departments. To do anything differently was simply unthinkable. We had a very different response from those familiar with the idea of hosting centres and institutes that function as partially-autonomous engines of top-class scientific productivity. Embedded institutes do not need to be large, but their resourcing needs to be generous, and needs to go along with a stringent requirement for continual, demonstrated success. The exciting and exacting science done in such places augments reputations and inspires the next generation of students. Institute membership is not a given: it is continually earned.

If a single, general conclusion can be drawn from our experiences, then it is that more universities need to learn how to host such centres or institutes. Universities are about discovering how the world works, and harnessing the knowledge to make the world a better place to live. What matters is to do excellent science, and large university departments find this difficult. Those of their scientists who have funding have no time, and those who have time have no funding. This is wrong: What matters is not even-handedness but excellence. Institutes are the way to do it.

In our own case, the most handsome offer we received came from Warwick University medical school, and it is here that we have nucleated afresh. Warwick has a reputation for being business minded, and we were and are comfortable with making a business case for our new centre. The new CMCB will now live or die according to the quality of what it does, and we are comfortable with that, too.

Professor Rob Cross, Director of the Centre for Mechanochemical Cell Biology, Warwick Medical School.

From the CMCB draft constitution

" .. The mission of the CMCB is to solve problems in basic mechanochemical cell biology, seeking to discover the molecular mechanisms and principles of active self-organization in living systems. The CMCB will address a single, well-focused question: How do living cells actively organize their contents in space and time? .."

BSCB Science Writing Prize 2011

We are very pleased to announce that the winner of the 2011 BSCB Science Writing Prize is John Ankers for his essay, "What makes us tick?"

The competition was judged by Tania Hershman, a former science journalist, and currently writer-in-residence in Bristol University's Science Faculty, working on a collection of biology-inspired short fiction. Tania's award-winning short stories have been widely published in print and online, and a week of her flash fiction was broadcast on BBC Radio 4 in June 2010.

Tania commented that John's essay "made beautiful use of the analogy of clockwork to present the topic in a refreshing and entertaining way, telling the story of the science without jargon and cliche. I felt informed, my knowledge had been increased, and I was left with a desire to know more, to research it by myself. A wonderful piece of writing, a very deserving winner!"

John completed his PhD on co-ordination between the cell cycle and NF-kappaB signalling at the University of Liverpool in 2009. Since then, he has been using quantitative live cell imaging techniques to develop mathematical models for mammalian cell cycle progression. John is interested in finding new and original ways to communicate cutting edge research to the general public and co-organised an exhibit, "The language of cells", at the Royal Society's summer science exhibition in 2006. John will be awarded his prize before the Hooke Medal lecture at the 2011 Spring meeting.

What makes us tick?

By John Ankers, winner of the BSCB Science Writing Prize 2011

From the changing seasons to our daily sleeping patterns or the beating of our hearts, biological cycles are all around us. What we now know is that some of these very different natural cycles work together like cogs or gears in a giant clock. Understanding how these clocks work (and how they can go wrong) might bring new hope for treating diseases such as cancer.

In the northern hemisphere, the passage of the Earth around the sun gives us cold winters and warm summers. These, together with daily tidal patterns controlled by the moon's orbit and a day-to-night cycle driven by a constantly spinning planet, put considerable strain on life on earth. How have plants and animals adapted to deal with such dramatic changes?

Imagine a huge, but invisible, clock. Environmental changes brought about by the sun and the moon turn cogs in this clock. The seasonal cog moves around once per year, the day-to-night cog is smaller and turns every 24 hours. These cogs are linked: as the earth moves around the sun, not only do the seasons change but the days get longer or shorter. Plants and animals have their own invisible clockwork. Each turn of the Earth's light/dark cycle creates "circadian" (Latin meaning "about a day") patterns of daily growth in plants and sleep in humans. The mechanics of the circadian cycle are complex, having evolved over millions of years, and sensitive to unexpected changes in the environment. This allows, for example, humans to react to abnormal periods of light or darkness (which may be experienced as jet lag) or plants to change their metabolism to compensate for a particularly harsh winter.

Many of the cells in the human body are repaired or replaced continuously (skin cells replace roughly every day, whereas nerve cells are never replicated). Fortunately for our clocks, this "cell cycle" is governed by a number of failsafes, ensuring that the correct cells are replicated in the correct way, and that this doesn't happen too slowly – leading to problems in early development, or too quickly - leading to the possibility of tumour formation. There has been much work done (and a Nobel prize awarded) on the discovery of proteins that regulate the pace of cell division. The cell cycle is mechanically connected to our daily circadian cycle (their cogs are linked), suggesting that the human body might be able to renew itself more efficiently at different times of the day or night. Recently, the cell cycle has been shown to interact with an intriguing group of different cogs. These much smaller, faster cogs (cycling from 100 minutes up to 6 hours) can be "hooked up" to the clockwork when they receive emergency signals - such as the need to respond to an infection, or if DNA inside the cell is damaged - freezing the cell cycle of a faulty cell before it can be replicated so that threats may be averted or any damage repaired.

All of this makes our clock incredibly complex. Nevertheless, many of these cogs are turning now, in every cell in your body. Some are accelerating, stopping and restarting whilst some are checking, repairing, destroying and rebuilding, and it is the links between these cogs that have dramatic effects on the overall clockwork, and hence the health of our cells and tissues. So what happens to the clock in diseases like Alzheimer's or cancer? And how do we, as observers, even contemplate fixing a faulty clock?

One of the reasons cancer is so difficult to treat is that a faulty cog in our clock (such as a cell cycle that is cycling too quickly) may be joined to many other "healthy" cogs such as those driving DNA replication and repair or the response to infection. Chemotherapeutic agents are used to destroy cells in the body with faulty cell cycles, but by doing so may also interfere with some other healthy cogs leading to severe side effects. Think of the challenge in repairing one faulty cog in the workings of a grandfather clock without disturbing the rest. Now imagine doing that whilst all the cogs are moving!

But it isn't all bad news. Such a complex problem is being tackled in new and fairly unorthodox ways. My field, that of "Systems Biology", is devoted to reconstructing the mechanisms that beat, pulse and oscillate inside the human body as computer models, just as an engineer might build a computer model of a plane or a skyscraper to identify and correct problems in its design. These models allow us to "virtually" unpick the clockwork of the human cell to see what makes it tick, and then probe and prod various parts in a way that might be too costly in the laboratory or unfeasible during surgery.

As we begin to understand more about how the clockwork of the cell is connected – how large, slow cogs wheels such as changing seasons, the circadian clock or cell cycle turn with smaller cogs like those driving emergency responses (or even smaller cogs cycling every few seconds like those driving electrical pulses in the heart or nervous system) - we may be able to design combination treatments that exploit the links between them. Slowing the cell cycle temporarily, for example, might allow a second drug to prompt a response to infection which would otherwise have been blocked. Although there is still much to learn about our internal clockwork - exactly how connected are all of these different cogs? Are there any we have yet to discover? - the ability to help a diseased cell to repair (or re-set) itself no doubt offers an exciting prospect, and is surely only a matter of time.

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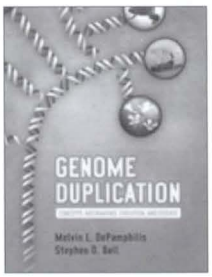
Book Reviews

Genome Duplication: Concepts, Mechanisms, Evolution and Disease.

MELVIN L. DEPAMPHILIS AND STEPHEN D. BELL



Genome Duplication: Concepts, Mechanisms, Evolution and Disease.
Melvin L DePamphilis and Stephen D Bell

Garland Science
October 2010
464 pages
185 illustrations
Paperback
978-0-415-44206-0

The concept behind this book is the fundamental importance of DNA replication to all aspects of life. By highlighting the interplay between genome replication, the cell cycle and cellular life, the book aids understanding of the constraints placed upon the system. Emphasis is placed upon the commonalities and divergences between replication in all the domains of life, and the writers use these examples to convey an understanding of the crucial concepts behind genome duplication. The idea that the evolution of a cellular mechanism has been driven by the specific environment of the organism is one that is key to a student's understanding of any life science.

The book is split into 15 chapters, including general overviews of subjects such as 'Genomes' and 'Three domains of life', before chapters are dedicated to specific mechanisms in replication. For example, the chapter on replication forks is followed by two separate chapters on the proteins of leading strand synthesis and the proteins of lagging strand synthesis. This level of detail would suit a postgraduate student wishing to gain detailed background information in a specific subject. Each chapter is accompanied by references and suggested further reading, if more in-depth study is required. The chapters cover the topics more than sufficiently for an undergraduate course.

The content progresses logically, with each variation of a particular mechanism explained in detail and examples given from specific bacteria, archaea, yeast, fruit flies, *Xenopus*, mammals and humans. The detail could overwhelm new undergraduates, but if they are looking for the basics, the beginning of each chapter is clearly explained. Examples of experiments used to make key discoveries are highlighted in boxes, with one or two per chapter. The mechanisms by which these experiments work are not explained in detail, and for an undergraduate to understand them fully, more basic reading may have to be done elsewhere.

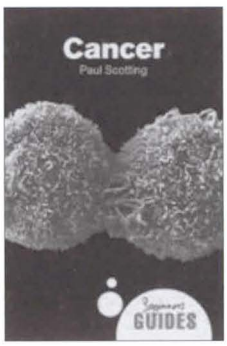
A minor issue in presentation is the use of only shades of black and red in the figures and tables. A bigger issue is the confinement of the few coloured diagrams (e.g. protein structures) to dedicated coloured inserts. Having to flick back and forth can be annoying, and the coloured inserts were often not easy to locate. However, it's only a minor gripe. The diagrams themselves, which are often used to explain complex spatial ideas in reference to DNA structures are clear, easy to understand and well explained.

Overall 'Genome Duplication' is an interesting textbook which presents its ideas well and tries to convey the unifying concepts across all the domains of life. Although the level is sometimes pitched above an undergraduate entering their studies, it provides a good source of detailed information and a starting point for a literature study for both undergraduate and postgraduate students.

Sarah Miles, School of Biochemistry, University of Bristol

Cancer – A Beginners Guide

PAUL SCOTTING



Cancer – A Beginners Guide
Paul Scotting

Paperback October 2010
One World, Oxford
978-1-85168-755-8

When I was a PhD student there was no Cancer chapter in "Alberts – Molecular Biology of the Cell" and no undergraduate courses in cancer biology. So I learned most of what a young developmental biologist felt he needed to know about cancer biology from a fantastic, fly-on-the-wall account of life in Weinberg's RAS lab written by the science journalist, Natalie Angier; it gave fabulous insight into the heady days when oncogenes and tumour supressors were first identified.

Nowadays there is a Cancer chapter in Alberts (if only on the web in the most recent edition), and outstanding review articles on all aspects of cancer biology...but where do you go if you want a primer to this field, and what do you give your Mum, if she expresses an interest in cancer? This new paperback might be just the thing. My own lab has been recently drawn into live imaging studies of cancer in zebrafish because of parallels we see between cancer and wound healing, and so I am hungry to broaden my background understanding of cancer. I read this little book in a couple of evening sittings and learned lots. Some fundamental cell and molecular things, like how the cell cycle works, are described in very basic terms and are no more than a reminder for most working cell biologists; but the writing is accurate and not patronising and I'm sure would be interesting for any lay reader; and there are several appendices, so extra details are easy to find but don't distract from the flow of the text. And then there was other science that I probably ought to have known about, but didn't. For example, there is a neat section on how viruses cause cancer which provides a clear and succinct overview of all the key players: Epstein-Barr virus (did you know it causes glandular fever in the west, but Burkitt's lymphoma in Africa, and triggers transformation of a completely different cell lineage in Southeast Asia, resulting in severe nasopharangeal tumours...and that these differences are largely due to varying levels of immunosuppression across continents), as well as the hepatitis viruses which cause liver cancer, and human papilloma virus, made famous by its association with cervical cancer.

But the main reason I enjoyed the book was the plethora of interesting anecdotal bits and pieces – Paul Scotting does a great job of drawing together historical and clinical facts and figures covering a broad range of cancers from breast cancer, which appears to be the only cancer to get significant mention in historical texts, to those like melanoma and lung cancer that have been significantly encouraged by aspects of our modern lifestyle. The list of familial cancer syndromes makes for sobering reading and the short sections on two of these, colon cancer associated with APC mutation (a really nice section on a how an observant medical student spotted a family with too much gut cancer and this family enabled the disease gene to be identified), and the breast cancer triggering BRACA genes.

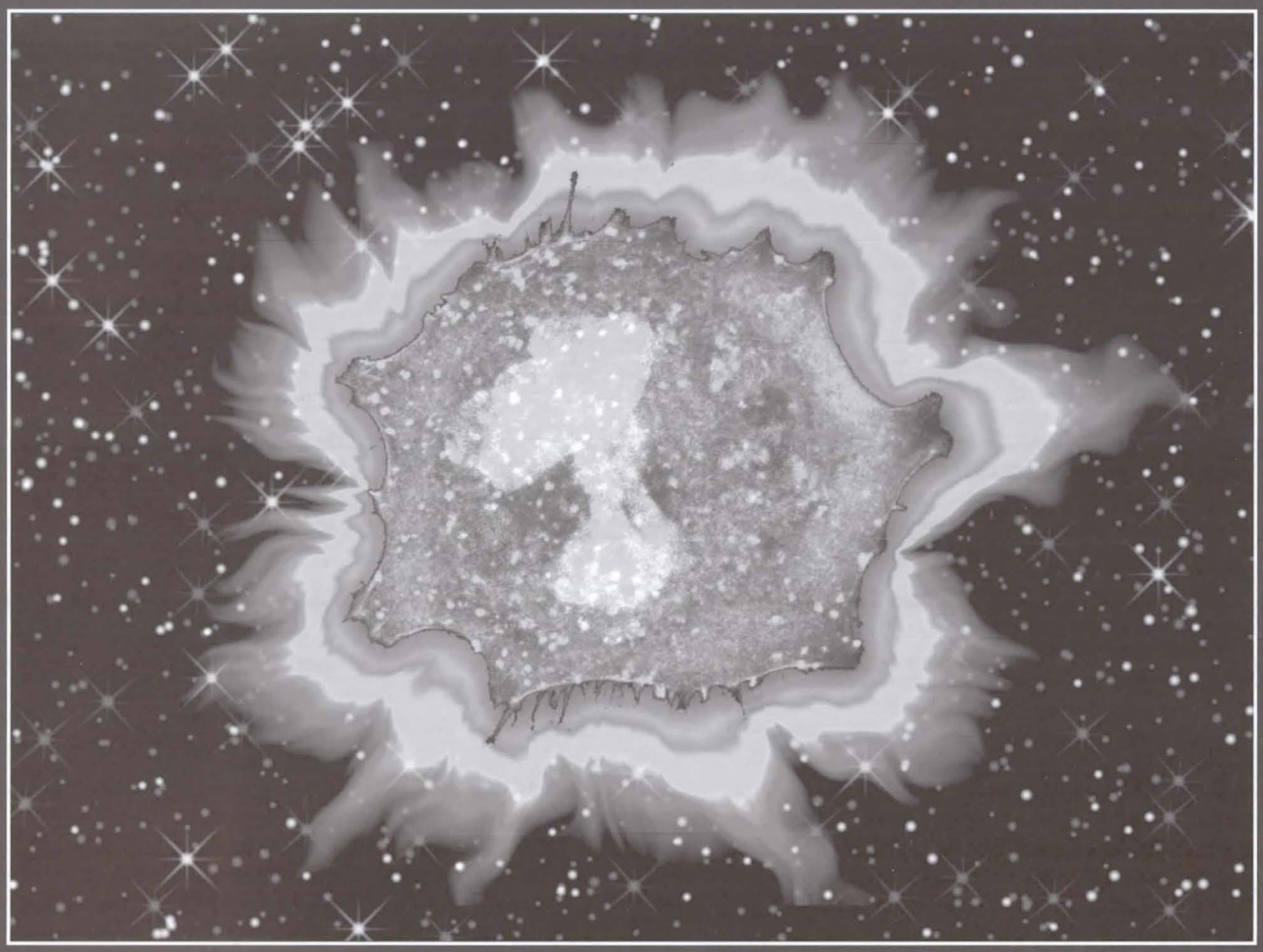
In Bristol we are sometimes asked to show CRUK fundraisers around and talk them through our research. I will use some of the things I read in Paul Scotting's book when I next meet with these folk, in order to provide some context for my talk. For example, Paul highlights how rare malignant cells are by saying that, if they were people then they would be the only person in 1000 earth's worth of people. Now that is very, very rare..... but unfortunately not rare enough, because we each are made up of so many cells that, on average, that means one cancer will arise in each human in 100 years! These are powerful and interesting descriptors and useful tools for teaching and fund raising, and if I were the CRUK, I'd buy a copy of this book for every manager of my charity shops.

Paul Martin, University of Bristol

CANCER RESEARCH UK

BEATSON INTERNATIONAL CANCER CONFERENCE

Co-sponsor ASSOCIATION FOR INTERNATIONAL CANCER RESEARCH



Cancer Models and Novel Therapies

Sunday July 3 – Wednesday July 6 2011 Glasgow, Scotland

Speakers and Sessions:

Keynote Address: Suzanne Cory (AU)
Signalling and Cancer I: Boris Bastian (US), Gideon Bollag (US), Lionel Larue (FR), Richard Marais (UK)
Inflammation and Cancer Stem Cells: Frances Balkwill (UK), Mariano Barbacid (ES), Tessa Holyoake (UK), Rob Nibbs (UK), Luis Parada (US), Marcos Vidal (UK)
Angiogenesis and Invasion: Federico Bussolino (IT), Peter Carmeliet (BE), Kairbaan Hodivala-Dilke (UK), Jim Norman (UK), Michael Olson (UK), Steve Wedge (UK)
Targeting Protein/Protein Interactions: Alan Fersht (UK), Paul Polakis (US), Saul Rosenberg (US), Dale Porter (US)
Signalling and Cancer II: Gerard Evan (UK), Margaret Frame (UK), Frank McCormick (US), Norbert Perrimon (US), Catrin Pritchard (UK), Owen Sansom (UK)

Aims of the Conference

This conference will focus on the use of biological models of human cancer that may be used to provide insight into the causes and processes of this disease. The study of these models will facilitate the discovery, development and testing of novel therapies.

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

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

For additional information please contact:
Conference Administrator, Beatson Institute for Cancer Research, Garscube Estate, Switchback Road, Bearsden, Glasgow, G61 1BD, UK

Tel: +44(0) 141 330 2896 Fax: +44(0) 141 942 6521

E mail: s.price@beatson.gla.ac.uk

Deadline for registration payment and abstract submission May 6 2011

the Beatson institute for cancer research

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

CANCER RESEARCH UK

Meeting Reports

Dicty 2010: The Annual International *Dictyostelium* Meeting

1–6 August 2010. Cardiff University, Wales, UK

After the previous annual international *Dictyostelium* conference (2009) was held in Colorado, USA, it was the turn for Europe to host a conference. This year Adrian Harwood, Cardiff University, agreed to host and organise the meeting. On 1 August 2010, leading *Dictyostelium* researchers from all over the world met in what was a sunny afternoon at the Julian Hodge lecture theatre.

Sunday began with registration followed by a buffet lunch, a welcome speech and finally an interesting introductory lecture about Cardiff – a city with a proud heritage of coal mining; money made from which led to the formation of the city. We were also told about the huge passion for the national sport, rugby. Following the lecture was a drinks reception, where we began to mingle and talk to various scientists from other laboratories across the world. Our evening was a free one, so a few of us decided to walk into Cardiff, past the famous Millenium stadium, and look at the city.

After breakfast, Mondays' lectures began at 0855 under the heading "Evolution and Diversity" with an interesting plenary talk by Greg Velicer (Indiana University, Indiana, USA) about a small RNA that controls *Myxococcus* development.

A further six talks then took place all under the same theme, which took us through to lunch and into the second session – "Cell Division" chaired by Harry MacWilliams (University of Munich, Germany). Richard Gomer (Rice University, Texas, USA) presented a talk, which I found particularly interesting about a chalone that uses G-proteins and RasG to inhibit *Dictyostelium* cell proliferation. The afternoon continued with talks on "Cell Biology" and finally "Genome Resources Workshop".

On Monday evening there was a poster session at the National Museum of Wales. Here I had the wonderful opportunity to present my first ever poster at an international conference. Mine was about using *Dictyostelium* as an early model for predicting emesis. I found the session very helpful, discussing my work with several researchers and obtaining a lot of positive feedback and advice on which direction to take my work.

Tuesday contained one of the most interesting sessions to me. Chemotaxis, the chemically mediated migration of a cell towards an attractant, is a crucial function involved in *Dictyostelium* cell migration, and is my current area of study. Chaired by Rob Kay (Cambridge University), the first chemotaxis session began with a fascinating plenary talk by Orion Weiner (San Fransisco University, California, USA) titled "spatial control of signalling during chemotaxis". Here he showed how he has used light to control protein localisation within cells.

The interesting talks continued with the most personally interesting of the chemotaxis ones being given by Regina Teo (Cardiff University), Loise Fets (Cambridge University) and Arjun Kortholt (University of Gronigen, Netherlands). Through these talks, I learnt a lot about needle point chemotaxis assays as well as enhancing my knowledge about phosphoinositol signalling. I also found it very interesting to learn about chemotaxis assays using the Dunn chamber, which is the method that I currently use.

Tuesday afternoon was the free afternoon and the opportunity to attend one of several organised trips. I attended the Big Pit museum – a massive quarry that was once used for coal mining, which told interesting stories about coal mining in Wales. This was followed by a trip to a Welsh vineyard.

Wednesday was a full day of talks followed by the second poster session of the week. Jeff Williams (University of Dundee) chaired the first session entitled Development followed by a biomedical session after lunch. In this session my supervisor, Robin Williams (Royal Holloway University of London), presented a talk that was based around a lot of the work that others in my lab have been researching, primarily using *Dictyostelium* as a biomedical model for epilepsy.

The afternoon continued with a second chemotaxis session. Again this was a very interesting session to me, the most personally interesting talks being given by Tian Jin (National Institute of Health, Rockville, USA) and Douwe Veltman (University of Glasgow) about coupling of G-protein coupled receptors in chemoattractant sensing; and WASP family proteins involved in organisation of pseudopodia in the absence of SCAR respectively. I also found it very useful to learn about tagging proteins with a fluorescent marker in order to identify certain chemotactic responses, a technique that would be of great use to me.

Wednesday evening was another poster session. This time I was not presenting and had a lot more time to look at the work that others were doing. Again, this session was very useful and highly interactive, allowing me to discuss my work with several people as

well as relate the work that others have been doing to my own. I paid particular attention to posters investigating various aspects of chemotaxis. This was a great opportunity for me to network and make contact with people that I wanted to meet to discuss my work.

Thursday was the final day, which began with a session hosted by Luchwig Eichinger (University of Cologne, Germany) on pathostelium. After lunch, Jonathan Chubb (University of Dundee) hosted the weeks second session on *Dictyostelium* development followed by a final session on cell biology chaired by Tomo Abe (Ishinomaki Senshu University, Japan).

After closing comments, there was a Gala dinner at the Millenium Stadium, where we were given the opportunity to tour the stadium. After the dinner, a prize giving session ensued, where various awards were given for talks and posters as well as thanking the organisers at Cardiff University.

I am extremely grateful to the BSCB for giving me a grant to travel to the annual international *Dictyostelium* conference in Cardiff. By going to this conference, I was given the opportunity to discuss my work with many leading national and international researchers in the Dictyostelium field.

They have subsequently given me a lot of advice with my work and I feel I have obtained several contacts, who will be able to provide me with advice on future experiments in the future.

Steven Robery
Department of Biological Sciences, Royal Holloway University of London

The EMBO meeting 2010

4–7 September 2010. Barcelona, Spain

The EMBO meeting 2010 held in the beautiful city of Barcelona was the second EMBO meeting so far. Around 1300 participants and 140 speakers from all over the world met at the Palau de Congressos de Catalunya for the four day meeting.

The meeting started on Saturday evening with an excellent opening lecture by Richard Losick (Harvard University, USA) on bacterial biofilms. He explained that biofilms can form on almost every surface or in solution – they can for example form inside pipes where they can cause corrosion, on hospital floors or inside catheter tubes resulting in problems with infection, or even inside the body where they cause many diseases. Biofilms are difficult to remove, however, biofilms age and disassemble naturally when nutrients become limited or waste products accumulate. Losick and colleagues investigated the disassembly mechanism further and showed that the production of D-amino acids plays an important role in the natural disassembly of biofilms. Most importantly, they showed that the addition of D-amino acids to existing biofilms triggers premature disassembly, which could provide a powerful tool for biofilm removal.

The scientific program for the following days was separated into two main parts – a keynote lecture and four plenary lectures were held in the mornings, followed by seven concurrent workshops in the afternoon.

A highlight of the meeting was the key note lecture on Sunday the 5th September. The Nobel Prize winner Elizabeth Blackburn (University of California, San Francisco, USA) talked about her work on telomeres and the enzyme telomerase. She explained the basic principle that telomeres shorten with every cell division and the importance of the telomerase to compensate this effect. The expression of the telomerase needs to be finely regulated as too much telomerase can support the development of cancer and too little telomerase can cause cell death. She showed that environmental factors as well as living conditions can influence telomere length and the activity of telomerase. Stress for example can decrease telomerase activity leading to shorter telomeres, regular exercise, however, can buffer these effects. Telomere length can be seen as a biomarker for aging. Nevertheless, Blackburn and colleagues showed that telomere length is not directly a marker for the length of life, but rather seems to be an indicator for health during the process of aging.

Talks in the three plenary lecture sessions focussed on the topics evolution of animal forms, system biology and functional genomics as well as signalling in development. Similarly, a great variety of research fields were discussed in more detail in the concurrent workshops, giving participants the opportunity to learn more about their own and other scientific fields and to put their own research into a new perspective.

A plus point of the meeting was that the organizer of the EMBO meeting made it very easy to meet speakers by offering so-called meet the speaker lunches. Every day at lunch the speakers of the morning sessions were available for informal discussions allowing participants to get together with the speakers right after the talks.

Additionally to the talks and workshops, three poster sessions took place in the afternoons in which almost 750 posters were presented from a wide range of topics including for example Molecular Medicine, Cell Cycle, Plant Biology, Neuroscience,

Development or Membranes and Transport. These sessions provided a great possibility to present and discuss my own work as well as the work of others and to find out more about research in other laboratories.

On Sunday and Monday, several additional talks were held after the poster sessions. Very intriguing talks included the special lecture on Sunday evening by Frans de Waal (Emroy University, USA) and the EMBO/FEBS Women in Science talk by Richard Haier (University of California, Irvine, USA) on Monday evening.

The primatologist Frans de Waal fascinated the audience with his talk "Prosocial primates: empathy, fairness and cooperation". He presented his work on empathy in animals and illustrated his findings with short movies of the behavioural experiments which his group and others performed on animals. He showed that empathy has many levels and that the basic forms such as emotional cognition likely exist in all mammals. The higher forms of empathy such as targeted helping, however, require self-other distinction, which is found in humans and a few other species including apes, dolphins and elephants. Moreover, he discussed his recent work on primate prosocial tendencies showing that they assists each other and he illustrates an aversion of inequity in primates, which seems to be an essential component of the human sense of fairness.

The psychologist Richard Haier explained what intelligence really is and how it can be measured. He showed which areas of the brain are activated in order to solve problems and he highlighted that men and women of equal intelligence use different areas of the brain to solve the same problem. However, on average men and women seem to solve a number of cognitive problems with different efficiency – men for example have better spatial imagination whereas women are better in understanding complex texts. Richard Haier seemed to suggest that these biological differences explain why women are under represented in higher scientific positions – a suggestion that caused much controversy.

The meeting also provided a great opportunity for job hunting and career planning for me and other participants. At the EMBO talking point current job offers could be posted and information about EMBO fellowships, courses and workshops was offered. Besides the main companies which are usually present at conference exhibitions, research centres such as the DKFZ (German Cancer Research Center), the EMBL (European Molecular Biology Laboratory) or the St. Jude Children's Research Hospital (USA) were present allowing jobseekers to find out more about the institutions and available jobs. Funding bodies such as the European Research Council were also on exhibition offering the chance to gain more information about funding opportunities. Moreover, the MPL Finanzdienstleistungen AG provided useful information about international pension schemes for scientists.

In addition to that, the organizers offered a career day for young scientists on Saturday the 4th of September before the official meeting started. On Monday a lunch session "Pursuing an academic career" was held of which different topics including planning your career, starting your own lab or the importance of publishing could be discussed with two mentors in small groups. This was a great occasion to ask and discuss questions in an informal environment.

Taken together, the EMBO 2010 meeting was a very interesting and successful meeting. It allowed me to explore other areas of research, to discuss my own work with fellow researchers and provided an excellent opportunity for job hunting and career planning. I would like to thank the BSCB for the Honor Fell Travel Award which allowed me to attend this meeting.

Annika Budnik
School of Biochemistry, University of Bristol

BSCB Sponsored Meeting: The North of England Cell Biology Forum

17 September 2010. University of Hull

More than 85 participants took part in the meeting, which is mainly aimed to provide PhD students and postdocs with an opportunity to present their research. The range of topics was very broad and covered intracellular transport, organelle dynamics, signal transduction and cell cycle regulation.

The £100 prize for the best talk was awarded to Nikki Copeland (York University) for his detailed study of the role of the replication factor Ciz1 in the establishment of DNA replication factories in mammalian cells. Using isolated nuclei he showed that the binding of Ciz1 to cyclin E and A/CDK2 complexes is regulated by Ciz1 phosphorylation/dephosphorylation and hypothesized that this cycle contributes to allowing only a single round of DNA replication per cell cycle.

Further prizes for oral presentations went to Eva-Maria Grimm-Günter (Hull University) and Samantha Hindle (York University). Eva-Maria presented her work on the function of the actin-bundling protein plastin 1 in the organization of the brush border cytoskeleton and inner ear stereocilia. Using knock-out mice she showed that plastin 1 is required to maintain the proper organization of the actin rootlets in the terminal web of intestinal microvilli.

Samantha Hindle gave an excellent presentation about the role of saposins in lysosomal function. Saposins are required for the lysosomal hydrolysis of sphingolipids. Using a *Drosophila* knock-out model she showed the effects of saposin deficiency at a cellular and organismal level. In flies she observed an age-dependent degeneration of neuromuscular ability and synaptic transmission, linking the fly phenotype nicely to lysosomal storage disorders with related pathology observed in humans.

Francisco Rivero, Klaus Ersfeld and Frank Voncken
University of Hull

BSCB Autumn Meeting: Cell Organisation Through The Cell Cycle

5–7 September 2010. St. Catherine's College, Oxford

The BSCB Autumn Meeting was organised by Buzz Baum (University College London), Gwyn Gould (University of Glasgow), Iain Hagan (Manchester University) and Alison Lloyd (University College London) in Oxford at St Catherine's College. St Catherine's College is in a very good location, close to the centre of this beautiful city and with comfortable accommodation not distant from the meeting rooms.

The meeting lasted two full days; it was very well organised with a number of different sessions including Growth and Form, Cells and Nuclear Division, Organelles and Trafficking through the Cell Cycle, and finally Cytoskeleton and Polarity. All of the talks were very informative and some focused on the role of endomembranes in cell division, a topic closely related to my PhD project.

At the beginning of the meeting, Keith Gull (University of Oxford) gave an interesting talk about the cell cycle in an uncommon model system, the Trypanosome. He described the analysis of the duplication of the basal body complex using a combination of biochemistry and fluorescence and electron microscopy experimental approaches.

Another interesting talk was given by Arnaud Echard (Institute Pasteur, Paris, France). He presented his work on Rab35 GTPase and the importance of this endocytic GTPase in the process of abscission during cytokinesis in human cells. Echard and colleagues found a new effector of Rab35: the Inositol polyphosphate 5-phosphatase OCRL-1 (INPP5F), which has been implicated in Lowe oculocerebrorenal syndrome, and whose gene maps to the human X chromosome. OCRL co-localises with Rab35 to the midbody and also depends on this GTPase for its accumulation at the midbody. Depletion of OCRL in human cells by siRNA delayed cytokinesis and abscission, similarly to Rab35 RNAi. Interestingly, the authors also reported that defects in cell abscission were also observed in primary culture of cells isolated from a patient affected by Lowe oculocerebrorenal syndrome.

An interesting presentation was also given by Joachim Seemann (University of Texas Southwestern, USA). His work focused on how Golgi membranes, which localise around the perinuclear area close to centrosomes in interphase, are partitioned during cell division. Seemann and colleagues used a very intriguing experimental approach to study Golgi inheritance. They manipulate cells to asymmetrically segregate the mitotic spindle only in one of the two daughter cells and observed that Golgi inheritance requires factors present on the mitotic spindle. This funding suggests for the first time that factors essential for post mitotic Golgi formation are associated and partitioned with the microtubule spindle. Now Seemann and colleagues are trying to identify those molecules responsible for post-mitotic Golgi reassembly.

Marcos Gonzalez-Gaitan (University of Geneva, Switzerland) gave an interesting talk about how endocytosis is also involved in Notch signalling in the fruitfly *Drosophila melanogaster*. Gonzalez-Gaitan and colleagues found that only endosomes positive for the Sara protein (SMAD anchor for receptor activation) were distributed asymmetrically in Sensory Organ Precursor (SOP) cells and this asymmetric distribution contributed to the asymmetric localisation of Notch and its ligand Delta. During mitosis in SOP cells, Sara endosomes containing Notch and Delta move to the central spindle during cytokinesis and are then specifically segregated only into one of the two daughter cells, pIIa, but not into pIIb cells. The inheritance of these Sara positive endosomes revealed a novel mechanism to increase Notch signalling specifically in one daughter cell during asymmetric cell division.

Jordan Raff (University of Oxford) gave a very interesting talk on how centrosome size is regulated in *Drosophila melanogaster*. His results indicate that the protein Centrosomin (Cnn) has a major role in the incorporation of other pericentriolar components and this determines the size of centrosomes. Using Fluorescent Recovery After Photobleaching (FRAP) analysis, Raff's group analysed the dynamic behaviour of Cnn and found that the incorporation rate of Cnn define the size of the centrosome. Cnn incorporation into the pericentriolar material (PCM) depends on the interaction of Cnn with other proteins such as Asl (Cep152 in humans) and DSpd-2 (Cep192 in humans). Furthermore daughter centrioles start to incorporate Cnn and consequently PCM after disengagement from the mother centrioles and this creates asymmetry in size between the two centrosomes. This is also true for the centrosome size asymmetry in *Drosophila* neuroblast.

I also enjoyed very much listening to the keynote lectures of Thomas Cavalier-Smith (University of Oxford) on the "Evolution of cell cycle", Marc Kirschner (Harvard University, USA) on "Cell size control", and John Kilmartin (University of Cambridge) on "Chromosome segregation in yeast". All these lectures presented a very interesting and global analysis of their specific topics.

During the conference we had two poster sessions with many interesting posters and during these time slots I could mingle with other delegates and also present my work, at my research poster where I got good feedback. The small number of participants created a very good atmosphere and fostered interesting discussions during and after the talks.

Overall the meeting presented a very good line up of speakers and although I could not mention all the talks, they were highly informative and highlighted the strong correlation between endomembrane trafficking and cell division, which is the topic of my PhD. Therefore I am very grateful to the BSCB for providing me with the Honor Fellow Travel Award that covered the expenses for my attendance at this exciting BSCB Autumn meeting in Oxford.

Luisa Capalbo
University of Cambridge

BSCB Sponsored Meeting: 4th European Conference on Tetraspanins

8–10 September 2010. School of Biosciences, University of Birmingham

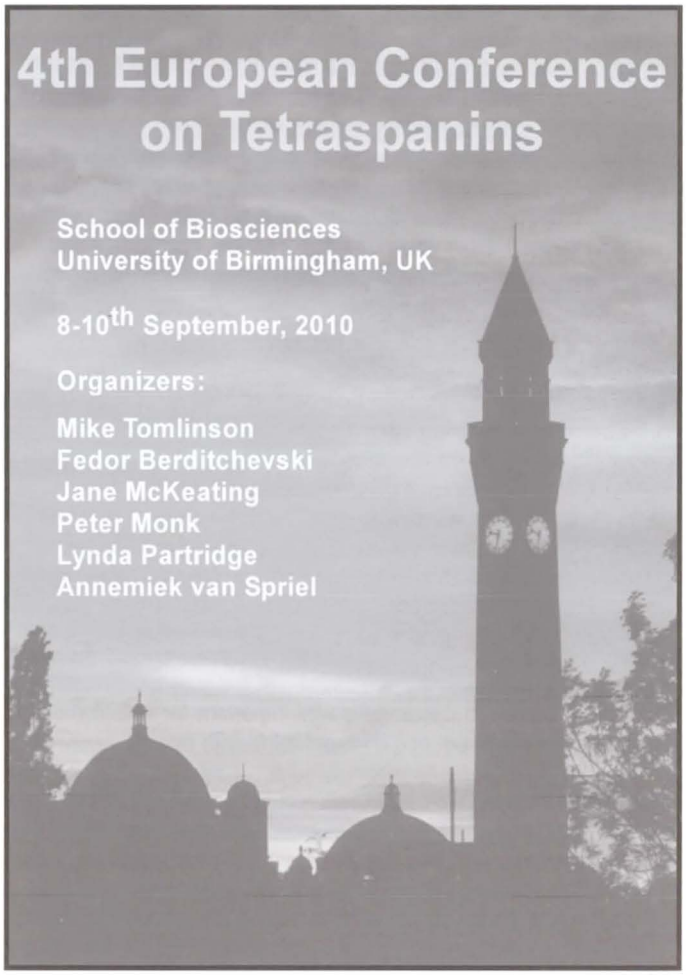
This year saw the 4th European Conference on Tetraspanins return to its University of Birmingham origins, following previous meetings in Madrid and Paris. The School of Biosciences hosted 90 participants, all eager to hear the latest developments in this emerging field.

In his keynote talk, Eric Rubinstein (Villejuif, France) set the scene by describing how 20 years of tetraspanin research has identified key roles for tetraspanins in cell motility, signalling, cell-cell fusion and viral infection, in organisms as diverse as humans, plants and fungi. He elegantly described his 'tetraspanin web' model, in which tetraspanins dynamically regulate the assembly of certain receptors and signalling complexes at the cell surface.

The dynamic movement of tetraspanins was further highlighted during the session on viruses and infection. Patrice Rassam, a PhD student from Pierre-Emmanuel Milhiet's group (Montpellier, France), described the quantitative microscopic approach of single particle tracking, and in collaboration with Markus Thali (Vermont, USA) discussed its use in understanding human immunodeficiency virus (HIV) assembly. They described the clustering and confinement of tetraspanin CD9 following multimerisation of the HIV structural component Gag at HIV assembly sites, illustrating a role for cellular and viral components in the formation of distinct membrane microdomains necessary for HIV assembly. Markus Thali also presented evidence that tetraspanins CD9 and CD63 play an important role in preventing HIV envelope glycoprotein induced cell-cell fusion, and discussed recent data identifying a role for CD9 and CD81 in influenza virus infection.

Helen Harris, a postdoc from Jane McKeating's group (University of Birmingham), utilised single particle tracking to study the dynamic movement of tetraspanin CD81, an essential component of the receptor for hepatitis C virus (HCV). CD81 was reported to be under the control of both protein-protein interactions and the cytoskeleton within tetraspanin-enriched microdomains. Moreover, CD81 association with tetraspanin-enriched microdomains was not essential for HCV infection, but certainly promoted infection. Michelle Farquhar, also a postdoc in the McKeating group, investigated the role of CD81 in HCV internalization and trafficking, demonstrating that anti-CD81 antibody and HCV envelope glycoprotein E2 receptor engagement promoted CD81 endocytosis to early endosomes in a dynamin- and clathrin-dependent manner. An interaction of CD81 with its partner protein Claudin-1 was essential for HCV entry and the co-internalization of CD81 and Claudin-1 was reported, supporting a role for the receptor complex in defining HCV internalization. Methodologies to improve the problematic production and purification of membrane proteins were discussed by Roslyn Bill (Aston University), who has successfully expressed and purified CD81 and Claudin-1 with a view to characterising the molecular basis of CD81/Claudin-1 complex formation.

Moving away from virology, Eisuke Mekada (Osaka, Japan) gave a fascinating presentation on genetic approaches for investigating tsp-15, one of 21 tetraspanins expressed by the nematode C. elegans. Tsp-15 mutants showed abnormalities or "blistering" of the exoskeleton, which in *C. elegans* is composed of cross-linked collagen. Screening novel mutants resembling the tsp-15 mutant phenotype identified genes involved in reactive oxygen species production, including homologues of the dual oxidase/Duox and DUOXA1 genes. The Duox peroxidase catalyses the cross-linking of tyrosines, which plays a crucial role in collagen cross-linking in C. elegans. Tsp-15 appears to act as co-factor, upregulating the activity



of Duox. As intriguing as the *C. elegans* blistering phenotype is the failure of sperm–egg fusion observed 10 years ago in CD9-knockout mice by François Le Naour (Villejuif, France). To investigate the mechanism, François Le Nauor now described the use of infrared microspectrometry and lipidomic mass spectrometry to compare the chemical composition of ovaries from wild-type and CD9-null mice in situ. These techniques identified specific spectral signals for oocytes and granulosa and showed that ovaries of CD9-null mice had decreased lipid content and changes in lipid composition.

The vascular biology session covered a broad range of topics, including lymphangiogenesis, vascular calcification, platelets and inflammation. Yoshito Takeda (Osaka, Japan) had previously demonstrated a role for the tetraspanin CD151 in angiogenesis, the process of new blood vessel growth from existing vasculature. Angiogenesis is crucial to the growth of solid tumours and is thus a major anti-cancer target. However, lymphangiogenesis, the growth of new lymphatic vessels, has received much less attention, despite its role in cancer metastasis. Yoshito Takeda demonstrated that lymphatic endothelial cells express several tetraspanins, including CD9 at high levels. Using lymphatic endothelial cells from CD9-knockout mice and a number of *ex vivo* assays, evidence for a role for this tetraspanin in lymphangiogenesis was presented. Dr Alexander Kapustin, a postdoc from Catherine Shanahan's group (King's College London), presented his studies on the mechanism of blood vessel calcification, which contributes to cardiovascular mortality and is a particular problem in kidney failure and diabetes patients. A key finding was that the smooth muscle cell-produced matrix vesicles, which are important for the initiation of calcification, appear similar to exosomes and express markers such as the tetraspanin CD63. Elizabeth Haining, a PhD student from Mike Tomlinson's group (University of Birmingham), reported her phenotypic characterisation of Tspan9-deficient mice. Most notably, the platelets from these mice exhibited impaired aggregation and spreading in response to the platelet-activating collagen receptor GPVI. Also in this session, Olga Barreiro from Francisco Sanchez-Madrid's group (Madrid, Spain), presented further evidence in support of her model that endothelial tetraspanins form 'sticky platforms' to promote the capture of white blood cells during inflammation. Elegant experiments used fluorescent imaging in tetraspanin knockout mouse models to show this phenomenon *in vivo*.

Tetraspanins have been widely studied with respect to cancer, and this was reflected in a number of talks on this topic. Martin Hemler (Boston, USA) described the role of CD151 in the development of squamuous cell carcinomas (SCC). Increased expression of this tetraspanin correlated with cancer progression in SCC patients. Direct involvement in development of the disease was further illustrated using CD151-knockout mice. At the molecular level, the presence of CD151 in cancer cells was important for stabilization of the protein kinase PKCδ, and its association with and phosphorylation of the β4 integrin subunit. It was hypothesised that in cancerous cells, CD151 facilitates recruitment of PKC to the plasma membrane and this plays an important role in the PKC-dependent switch in α6β4 integrin function. Rafal Sadej, a postdoc in Fedor Berditchevski's group (University of Birmingham), gave a talk on the role of CD151 in breast cancer. He provided evidence that CD151 regulates responses of cancerous cells to the tumour microenvironment. By analysing tumour cell behaviour in the presence of various soluble factors, it was established that CD151 controls cellular responses to TGFβ1, a cytokine which is known to control the metastatic process in breast cancer. Accordingly, depletion of CD151 from breast cancer cells attenuated pulmonary metastasis.

The tetraspanin CD82 has been described as a metastasis suppressor in prostate cancer. Eva McGrowder, a PhD student from the laboratory of Elena Odintsova (University of Birmingham) investigated the involvement of CD82 in responses of breast cancer cells to Herceptin, a humanised monoclonal antibody which targets the receptor tyrosine kinase Her-2/ErbB2 and is currently used for the treatment of Her-2-positive breast cancer patients. The data showed that elevated expression of CD82 modified the growth responses of breast cancer cells in three-dimensional extracellular matrix. Cindy Miranti (Grand Rapids, USA) generated a strain of CD82-knockout mice. The animals developed normally, but as they aged they displayed a defect in kidney and urinary function. The absence of CD82 also facilitated experimental angiogenesis, thus suggesting that CD82 may be involved in tumour vascularization.

In the immunology session, Mark Wright (Melbourne, Australia) reported the role of tetraspanins in the migration of immune cells, which could explain the impaired adaptive immunity that he has observed in tetraspanin-knockout mice. Annemiek van Spriel (Nijmegen, The Netherlands) discussed the role of tetraspanin CD37 in the humoral immune response. She discovered that CD37-deficiency leads to increased production of immunoglobulin A *in vivo*, which positively affects host responses to infectious disease but is detrimental for the development of glomerular IgA deposition and renal pathology. María Yáñez-Mó (Madrid, Spain) presented her group's studies on the tetraspanin-interacting protein EWI-2. This protein was shown to associate with the cytoskeletal protein α–actinin and may be involved in immune and virological synapse formation.

In the final session, the role of tetraspanins in the regulation of protease activity was highlighted by Jean-François Ottavi, a PhD student with Eric Rubinstein and Philippe Mauduit (Villejuif, France). The cell surface expression of ADAM10, a protease involved in the shedding of growth factors TNFα and EGF, was found to be controlled by tetraspanin Tspan5 which interacts with ADAM10 in intracellular compartments. The emerging link between tetraspanins and Alzheimer's disease was discussed by Francesc Guix, a postdoc in Bart De Strooper's group (Leuven, Belgium). Alzheimer's disease is characterised by senile plaques in brain neurons, composed of amyloid-beta peptide which is produced by the activity of the γ-secretase protease complex. An increase in amyloid-beta peptide correlated with raised expression of CD9 and CD81, tetraspanins which associated with the γ-secretase complex and modulated amyloid-beta peptide production. Finally, Stéphanie Charrin, a postdoc in Eric Rubinstein's group, reported on the role of tetraspanins CD9 and CD81 in muscle development. Known to be critical for membrane fusion during fertilization and in monocyte giant cell formation, these tetraspanins were shown to co-operate in the regulation of myoblast fusion.

In conclusion, the 4th European Conference on Tetraspanins upheld the fine tradition of previous conferences by giving young scientists the opportunity to present their data. Moreover, the friendly environment, that is a characteristic of tetraspanin meetings, facilitated interactions between leaders in the field and the most junior of PhD students. All of this would not have been possible without the generous support of the British Society for Cell Biology and several other sponsors, namely the Biochemical Society, the British Heart Foundation, LI-COR Biosciences, Millipore, Proteintech, BMG Labtech, New England BioLabs, Web/Thistle Scientific, AbD Serotec, BioServ, LabBio and ThermoFisher Scientific.

Mike Tomlinson, Fedor Berditchevski, Michelle Farquhar and Jane McKeating (University of Birmingham), Peter Monk and Lynda Partridge (University of Sheffield), and Annemiek van Spriel (Radboud University Nijmegen, The Netherlands).
Image taken by Prof Robert Insall

The 13th International *Xenopus* Conference

12–16 September, 2010. Alberta, Canada.

Xenopus is a powerful model organism that can be used to study cell and developmental biology. The International *Xenopus* Conference is held every two years and welcomes researchers working on this organism from across the world.

This time the meeting was held at the beautiful Chateau Lake Louise, Alberta, Canada. The chateau is situated in the Canadian Rockies, which provided a spectacular backdrop to the conference. The meeting opened with a welcome reception on the Sunday afternoon; dinner was followed by a one hour presentation from Nancy Papalopulu (University of Manchester). The talk addressed Nancy's work on the development of the neuro-ectoderm, focusing on the mechanisms controlling neural progenitor maintenance. Some beautiful immunofluorescence showed the distribution of proliferative progenitors and cells committed to the neural cell lineage. This opening talk provided a good link between cell and developmental biology, a theme that was continued through out the conference. After this a mixer was held to allow people to meet up and chat about their research or simply for friends in the field to catch up with each other. Because this was my first conference the mixer allowed me to meet some of the researchers in my field for first time. Importantly, it also allowed me to meet other PhD students who are in the same position as me and with whom I will hopefully remain in contact with in the future.

Traditionally the *Xenopus* conference has been heavily focused on developmental biology and the sheer volume of *in situ* hybridisation data has threatened to push the attending cell biologists over the edge. However this year the conference organisers (Marko Horb, Peter Vize, Todd Stukenberg, Leon Browder and Jeff Bowes) catered for the cell biology community making the meeting much more balanced. Several talks displayed some fantastic images of the mitotoic spindle and presented ideas on the importance of Aurora B in chromosomal separation. Other talks addressed the asymmetric division of stem cells in the developing nervous system and how the asymmetric localisation of factors in the oocyte influences dorsal–ventral axis formation. One of my favourite talks, by Ray Keller (University of Virginia, USA), addressed how the anterior–posterior identity of the cell influenced mediolateral intercalation. The cell and developmental biology fields are interlinked and yet members of the respective communities do not always mix. Being able to meet people working in both fields at the conference has helped me understand my research better and influenced how I will progress with my PhD.

The conference also highlighted the versatility of *Xenopus* as a model organism. The *Xenopus tropicalis* genome has been sequenced, so next generation sequencing techniques can be used on *Xenopus*. A talk by Richard Harland described the use of both the recently completed genome and next generation sequencing to show that knocking down a particular gene affected mRNA splicing. Forward and reverse genetics are now more feasible in *Xenopus* with two talks describing enhancer trap and Wnt-catenin reporter transgenic lines. In addition to the other advantages of using *Xenopus* these new techniques mean that it can be used to explore many scientific problems in both cell and developmental biology.

The poster presentation was held on a balcony overlooking the entrance hall to the hotel. This was a nerve-wracking experience as I had never presented a poster before. My nerves were compounded when nobody spoke to me for the first hour and typically the person next to me was inundated with people interested in their work. Special thanks must be given to Brian Mitchell (Northwestern University, USA) for coming to speak to me and bringing me out of my shell. In addition, he provided helpful advice on other experiments to try. I was kept busy for the whole of the second hour taking people through my poster and most of these seemed interested in my work so far. It's hard sometimes, when focused on your experiments, to realise that other people find your work exciting. The realisation that other people are interested in my research was the best experience of the conference. For this reason I would advise all PhD students to try and present at a conference when ever they get the opportunity.

The Wednesday night heralded the banquet dinner and a chance to shrug off that favourite lab T-shirt and dress smart for the evening. Following the meal a band played while everyone had the chance to mix for the last time and reflect on the conference as a whole. The dance was a chance to relax and enjoy everyone's company without the pressure of trying to remember the last 37 publications of the PI you were speaking to. This allowed me to really get to know the people I had met at the conference and went further toward building a lasting network of colleagues than discussing research alone. The following morning saw the final presentations, although standing to ask questions provided a greater challenge than on the previous days. Overall the conference was a brilliant experience; I learnt a lot, established a network of colleagues and felt welcomed into the larger *Xenopus* community. I would like to thank the BSCB for the generous grant they gave me – it made the whole trip possible.

Simon Fellgett, University of York

Telomeres and the DNA Damage Response

14–17 September 2010. Marseille, France

At the stunning Marseille bay, over 200 scientists from all over the world shared their recent discoveries on telomere biology, DNA repair and chromatin structure. There was plenty of sunshine to energize everyone for the talks, posters and social events. The atmosphere was relaxing while electrifying; poster sessions would usually last until midnight.

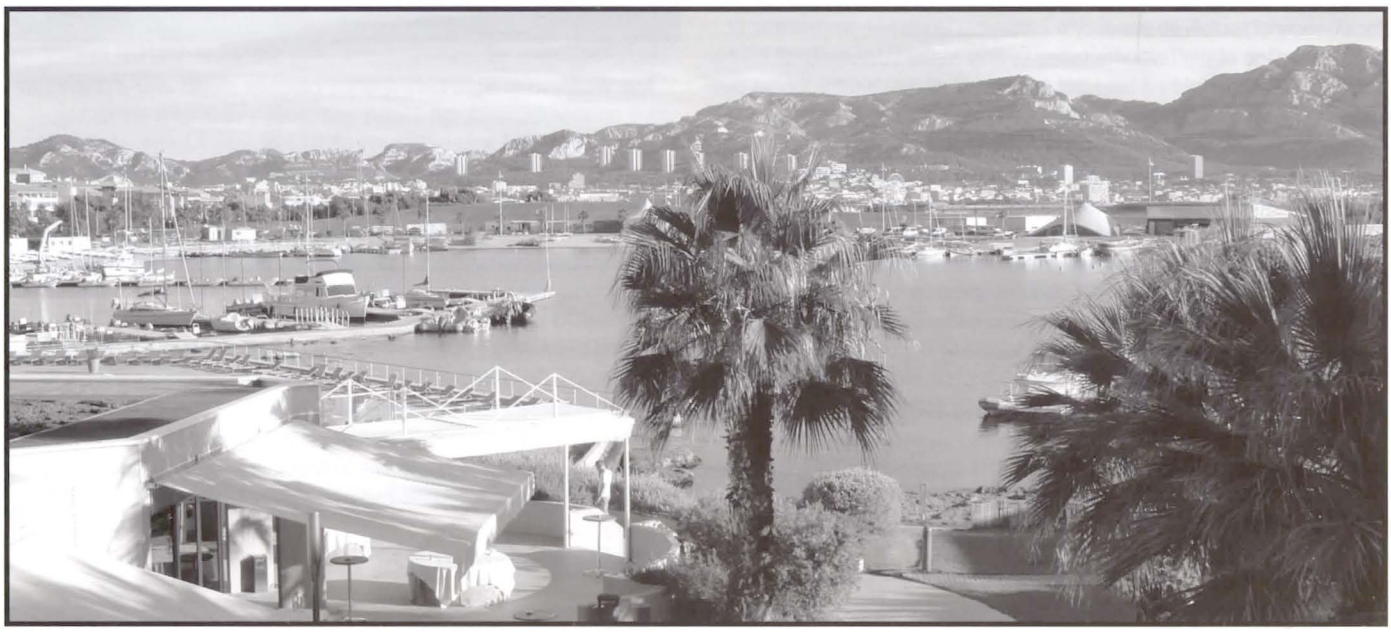
The conference was part of the EMBO conference series and was organised by Dr.Vincent Geli and Dr. Lea Harrington. This four-day event was held in the Pullman Hotel, overlooking the beautiful coastline of Marseille. Over 200 researchers from around the world attended the conference including the Nobel Prize winner Elizabeth Blackburn and many other pioneers of the field.

We arrived during the afternoon of 14th September. After registration, Professor Elizabeth Blackburn started the conference with a keynote speech, giving an overview of the history of the telomere biology field. She then talked about her current research, and demonstrated that transient knock-down of the telomerase RNA TLC1 in some cancer cell lines triggers a 'differentiation signal', which rapidly inhibits cancer proliferation. Another area of her research focuses on the study of ageing in yeast mother cells. In collaboration with researchers from UCSF, the Blackburn group set up a microfluid device with single cell resolution imaging tools. After each budding event, the daughter cells can be simply washed away, leaving mother cells in the device to be recorded. Normally it took 30-40 generations for a mother cell to stop budding (which is called the budding lifespan). In est2 mutant, the budding lifespan of mother cells is reduced to 15-20 generations.

On the second day, we enjoyed a delicious French breakfast on the balcony with a sea view and started the morning completely fresh. The day was organised into 4 sessions, each lasting for 1hr 30min, separated by short breaks and lunch. In the first session, Joachim Lingner presented his groups' work on telomeric RNA TERRA. TERRA was discovered only two years ago, making it the most rapidly growing area of research in telomere biology. *In vitro* data showed that TERRA acts as a potent competitive inhibitor for telomeric RNA. In yeast, the exonuclease Rat1p is responsible for the degradation of TERRA. Lingner's group found that telomere elongation by telomerase is impaired in the rat1-1 mutant. Their results suggested that TERRA is a natural telomerase ligand, which directly inhibits its enzymatic activity.

Pascal Chartrand from the University of Montreal developed a GFP reporter system to visualize trafficking of yeast telomerase RNA in living cells. His methods brought some new insights into how telomerases are assembled and trafficked *in vivo*. For example, in G1 and G2 phase, the GFP-tagged telomerase molecules form small foci that are not stably associated with telomeres. The foci become larger, stable clusters ('telomere replicating clusters') in late S phase, when telomere is elongated.

Another highlight was the talk given by Dennis Kappei from the Max Planck Institute, who has identified a new telomere binding protein TRF3. His data showed that TRF3 directly binds double stranded telomere sequences and positively regulates telomere length. He also showed that TRF3 physically interacts with telomerase, yku70/80 as

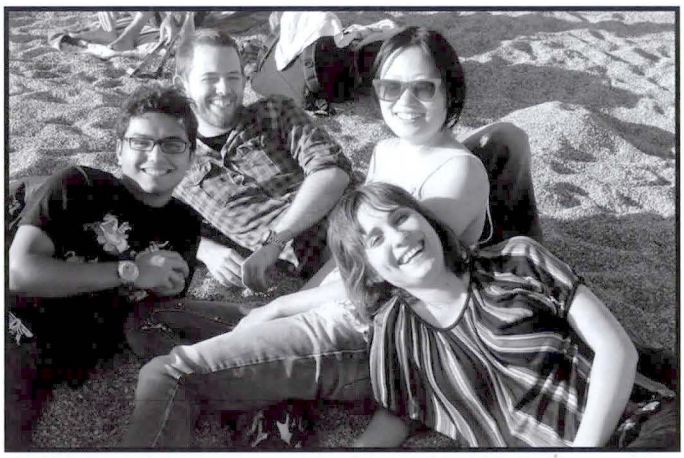


well as the Cajal body.

The evening featured a live band performance with a delicious French banquet, and offered a fantastic time to socialise with fellow scientists. The poster session began at 8.30pm and lasted beyond midnight. Thomas Tan from Ed Louis's lab presented his research on the immortal freshwater worm *S. mediterranea*, which serves as a novel model organism for studying telomerase and ageing. John Wu from Harvard University was developing a super-resolution microscopy technique called STORM (stochastic optical reconstruction microscopy), which can be used to probe telomere structure *in vivo*. This poster eventually went on to win the poster prize of the conference. In the evening I also had the chance to chat with renowned scientists including Joachim Lingner, Raymund Wellinger and Lea Harrington. To my delight they were all extremely kind and supportive to PhD students.

On the third day there were plenty of interesting talks. Bruno Bernardes de Jesus from the Spanish National Cancer research centre reported a successful 'gene therapy' to reverse the ageing phenotype in adult mice. His study used an adeno-associated virus vector to deliver telomerase in mice. Intriguingly, this method significantly extended life span without increase the risk of cancer. Daniel Durocher from the University of Toronto reported that the checkpoint protein 53BP1 could interact with the dynein light chain. Based on this and other data he proposed that a 'repair motor' might exist to bring the damaged chromatin to the nuclear periphery for further processing.

A free afternoon allowed us to relax on the local beach and reflect on the day's intriguing talks. We freshened up with a swim in the Mediterranean Sea while many other participants explored historical sites in the old town. The evening's poster session was full of interesting presentations. Our poster on 'the role of Rif1 protein in double stranded break repair' attracted attention from many scientists and editors. My colleague Michael and I had an extremely busy time presenting our results during the whole evening until midnight!



Numerous exciting discussions were sparked and we received very valuable feedback, advice and ideas.

Overall, I tremendously enjoyed the conference. I have acquired a new perspective of the field and met many great scientists from around the world. I was deeply impressed by their enthusiasm and kindness, and felt warmly welcomed in the research community. After the conference, I performed experiments that were suggested to me and made progress in my research. I also made friends and met potential collaborators whom I still am in contact with. I would like to take the opportunity to thank my supervisor Dr. Laura Maringele and the Newcastle University, who provided me with a generous travel fund. I would also like to congratulate the organisers for organising such a successful event.

Lya Yuan Xue
University of Newcastle

ESF–EMBO Symposium on Emergent Properties of the Cytoskeleton

3–8 October 2010

The first Emergent Properties of the Cytoskeleton symposium took place at Hotel Eden Roc, Sant Feliu de Guixols, Spain. The scope of the meeting attracted participants from around the world and from multiple disciplines, promoting discussion on a broad context from *in vitro* reconstituted systems to clinical trials.

Sunny weather and warm temperatures provided an extension of summer for those from colder climes and showed off the spectacular scenery. The sessions were organised to include short talks allowing more researchers the chance to present data.

The first session addressed recent advances in myosin structure and function. Co-organiser Michelle Peckham (University of Leeds) gave an overview of diverse members of the myosin superfamily providing a good introduction to the session. The following talks included data on myosin family members from many species including an interesting talk from Claudia Veigel (University of Munich, Germany) of her observations of the acto-myosin machinery of *Plasmodium falciparum*.

The topic of the next two sessions was actin dynamics and organisation. Thomas Iskratch (King's College London) presented interesting data on the regulation of a novel splice variant of FHOD3 in

muscle. This formin family member contains a casein kinase 2 phosphorylation site that controls localisation to myofibrils. Another highlight was Jennifer Gallop's (Harvard Medical School, US) talk presenting work reconstituting the formation of filopodia-like structures *in vitro*. She showed that filopodia tip complexes can self organise on lipid bilayers containing phosphatidylinositol 4,5-bisphosphate. Additional *in vitro* work came from Florian Huber (University of Leipzig, Germany), who showed the bundling of actin into networks in cell-sized droplets. These sessions also included advances in cell biology and medicine. Anne Ridley (King's College London) described how T-cell receptor activation inhibits T-cell migration by regulating the activity of Rac1 and RhoA. Peter Gunning (University of New South Wales, Australia) described the potential for anti-tropomyosin therapeutics in cancer, providing an outstanding example of translational research in action.

Forces in cell adhesion and intracellular transport were the basis for the next two sessions. Pierre-François Lenne (Institut de Biologie du Développement de Marseille Luminy, France) gave an excellent talk coupling computer modelling with cell biology to explore the role of acto-myosin contractility in tissue morphogenesis. *In vitro* reconstitution of cellular signalling was again a hot topic as demonstrated by David Richmond (University of California, Berkley, US) whose talk on the formation of vesicles by microfluidic jetting captivated the audience.

The topic changed to Microtubules and Motors on the final day. Again, a good mix of *in vitro* and *in vivo* data were presented. Erika Hozbaur's talk (University of Pennsylvania, US) showing comprehensive work on dynein function as a microtubule tether, as well as a vesicular motor protein, was one of the highlights.

Poster sessions provided further opportunities for data to be presented and discussed. Azumi Yoshimura (Washington University, US) presented interesting data complementing a talk by John Heuser (Washington University, US) on the use of electron microscopy to visualise the ultrastructure of the cytoskeleton. Their work included an extra element of novelty, as images were processed so they could be viewed in 3D through glasses provided to the audience.

The meeting was a great success and looks likely to become a regular feature of the conference calendar for cytoskeletal research.

Michael Bright, Imperial College London

{ As the title of the conference suggests, the subject of discussion was the cytoskeleton. A glance through the program revealed an exciting mix between cell biologists, biochemists and biophysicists (plus a few pure physicists just to add some extra theoretical spice) which would – hopefully – fully encompass the idea of "molecules to cells". }

Our venue was the delightful Sant Feliu on the Costa Brava with our hotel situated above the town, overlooking the bay. The weather was perfect throughout – sunny, warm, blue skies and light winds. The conference room had beautiful views out towards the Mediterranean providing a stunning backdrop to what was sure to be a week of provocative, cutting-edge cytoskeletal science.

Each day was organised into a morning and afternoon session, with a few hours in between to swim in the sea or explore the town. Each session was jam-packed with talks, and as such we have only been able to describe a few of – what were all – fantastic talks.

The first session focused on myosin structure and function. Michelle Peckham (University of Leeds) gave an interesting talk on the contribution of SAH domains to myosin function. *In silico* analysis of myosin 10 suggested a region of coiled-coil; however, further investigation demonstrated that this region was unlikely to form a coiled-coil and was in fact a single alpha helix (SAH) domain. This was proposed to have implications for the working stroke of myosin since the SAH domain could contribute directly to the lever arm. Furthermore, SAH domains were potentially identified in myosin 7a, MyoM and myosin 6.

This concept was further expanded in an elegant experiment by taking 4 of the 6 IQ domains from myosin 5a and replacing them with a SAH domain from MyoM. Optical trap experiments demonstrated that the working step for this myo5a-SAH mutant did indeed contribute to a lengthened working stroke.

The second session covered actin dynamics and organisation and began with a talk from Marie-France Carlier (CNRS, France). She gave an interesting overview on actin dynamics and an insight into the molecular and physical mechanisms that contribute to force and cell movement. She highlighted the importance of two branching mediators N-WASP and Arp2/3. These proteins are fundamental in the regulation of the actin cytoskeleton.

This was followed by a talk by Jonathan Terman (University of Texas, US). He described his groups' recent findings on MICAL, a cytosolic protein and a redox enzyme known to be important for axon guidance. *Drosophila* were used to elucidate the cellular function of MICAL and its substrates. He showed that MICAL uses its redox activity to modify F-actin dynamics *in vitro* and *in vivo*. MICAL is also activated and needed for semaphorin/plexin induced F-actin reorganisation.

The following day continued with a range of interesting talks on actin dynamics and organisation. John Heuser (Washington University, US) described the different tools that have been developed over the past 30 years in dissecting the structure of the cytoskeleton. For decades, he has used a quick-freeze deep-etch electron microscopy technique that he developed. This enables biologists to capture detailed images within cells. We were given a pair of red/green 3D glasses and were able to see 3D views of the cytoskeleton using EM anaglyphs. It was a memorable talk describing a novel technique.

This was followed by an interesting talk from Rhoda Hawkins (University of Bristol). She explained the use of an analytical model for examining cell polarization in mating budding yeast and neuronal growth cones. In this model, she reported that the geometry of the organisation of cytoskeletal filaments is crucial and responsible for whether the system is able to polarize spontaneously or if polarization is driven as a result of external signals.

Anne Ridley (King's College London) presented some exciting work from her laboratory on the role of RhoA signalling in T cell transendothelial migration (TEM). An RNA interference screen was used to identify that RhoA is required for TEM. Upon knockdown of RhoA, cells lose migratory polarity. RhoA activity was analysed in

transmigrating T-cells using a Raichu biosensor. This demonstrated that RhoA is active at the leading edge, and in the uropod, where RhoA activity is associated with the regulation of the ROCK pathway. Taken together, the data demonstrated that TEM of T-cells is coordinated by RhoA activity at the leading edge of T-cells.

The next day focused on cellular transport. Stephanie Miserey-Lenkei (Insitut Curie, France) discussed her recent findings on the role of myosin II and Rab6 in fission of transport vesicles at the Golgi-complex. Rab GTPases ensure both the specificity and directionality of trafficking by regulating the movement of transport carriers along the cytoskeleton. It was shown that Rab6 specifically interacts with myosin II and is necessary for the localisation of the latter at the Golgi and the fission of Rab6 vesicles. Furthermore, inhibition of either myosin II or Rab6 impaired both the fission of Rab6 transport carriers from the Golgi and the anterograde/retrograde trafficking suggesting a role for myosin II as an effector of Rab6 in these processes.

As a break in proceedings, we had the afternoon off to either explore Sant Feliu or to take a coach ride to nearby Girona; as a result a large cohort of cytoskeletal biologists descended on Girona (saying nothing of Sant Feliu – rather the need to satisfy our scientific yearning for all things new). Having been deposited on the outskirts of Girona, we split up into a few groups and the more foolhardy among us took charge of our directed migration towards the centre of Girona. Fortunately, the lure of high quality ice-cream served as a more than sufficient chemoattractant and we successfully found our way into the City centre. Upon arrival many of us made our way to the beautiful, ancient cathedral – once a site of a mosque used by the Moors – and indulged our cultural side. However, it wasn't long before we had to head back and remember that we were here to talk about science and not Spanish gothic architecture!

The final sessions focused on microtubules with Carolyn Moores (Birkbeck College) presenting work on kinesin 8 (K8) which unlike other kinesins can both walk towards microtubule plus-ends and depolymerise them on arrival. Despite this, little is known of the mechanism of depolymerisation. By solving the crystal structure for K8 and achieving a 10 Å structure for the K8-microtubule complex using cryo-EM, loop 2 of K8 was identified as being in contact with α-tubulin. In contrast to the crystal structure, where loop 2 is in a disordered conformation, it adopts a well-defined conformation on the MT surface. Interestingly, loop 2 of kinesin 13 (K13) is essential for MT depolymerisation and both K8 and K13 have a long loop 2 (compared to kinesin 1). Thus, the mechanism of MT depolymerisation by K8 and K13 is similar and linked to a longer loop 2.

On the last night of the conference, a drinks reception was followed by a delicious three course dinner, accompanied by wine and champagne. We were also served a beautifully decorated cake made by the hotel specifically for all the conference attendees. Following dinner, winners from the poster session and talks were announced and presented with their prizes. The evening entertainment of flamenco dancers was the highlight (and much anticipated!) event of the night. It was a lively show of music and dance in vibrant and colourful costumes and the perfect way for the conference to come to an end.

The conference was both informative and thought-provoking. It invited us to expand our knowledge in the field and covered a range of talks on different and unique aspects of the cytoskeleton. It was also a fantastic opportunity to discuss our work with other participants and experts in this area of scientific research. Attending this conference also highlighted the exciting advances and novel techniques in this field of science.

We would like to thank the BSCB for our Honor Fell Travel awards which allowed us to attend this brilliant meeting. We would also like to thank all the conference organisers and attendees for making it such a great experience.

Andrew Irvine (University of Leicester) and Sally Fram (King's College London)

Nature CNIO Cancer Symposium: 'Frontiers in Tumour progression'

24–27 October, 2010. Madrid, Spain

Taking place in the sunshine of Madrid, the CNIO Cancer Symposium "Frontiers in Tumour Progression" last October was excellent, well organised and structured, covering a huge variety of topics in the field of cancer progression studies.

The meeting began with two fascinating talks from leaders in the field of tumour metastasis. Joan Massague (Memorial Sloan-Kettering Cancer Center, New York) introduced the idea that a specific gene signature primes circulating tumour cells to infiltrate a particular organ during the process of metastasis. Michael Karin (UCSD School of Medicine, San Diego) then discussed how inflammation and immunity affect tumour and metastatic progression.

The symposium was split into sessions covering key areas of cancer biology. Monday started with "Genetics, Mouse Models and Mechanisms". Among the speakers, Jacqueline Bromberg (Memorial Sloan-Kettering Cancer Center, New York) showed the importance of the immune system in tumour progression a topic introduced by Michael Karin the previous evening. By using mice deficient in IL-6 she was able to show a reduction in the rate of lung cancer progression as well as less vascularised tumours. Other talks covered topics from tumour initiation by C-Raf (Rafael Blasco-Patino, CNIO Madrid) to cancer stem cells and the vascular niche (Benjamin Beck, Universite Libre de Bruxelles). The afternoon started with one of the most interesting sessions of the meeting, "The Metastatic Cancer Cell", in which advances in technology to image the invasive behaviour of tumour cells *in vivo* were shown. Erik Sahai (Cancer Research UK) demonstrated the importance of Brn-2 transcription factor expression during melanoma metastasis using novel intravital multi-photon confocal imaging of tumours in anaesthetised mice. The work of Bojana Gligorijevic (Albert Einstein College of Medicine, New York) was equally impressive, she demonstrated the presence of invadopodia-like structures in primary tumours.

The evening poster session held in the Palacete de los Duques de Pastrana allowed over 70 posters to be displayed, discussed and enjoyed. The wide range of research in tumour progression covered topics from cell migration and invasion to the role of genomic instability in human tumours. Everyone from the keynote speakers to first year PhD students seemed to be involved in lively discussions focused on the excellent work presented on the posters.

Tuesday morning started with a session on "Inflammatory Modulators" a topic that had already sparked interesting discussions on the previous days. Johanna Joyce (Memorial Sloan-Kettering Cancer Centre, New York) presented an intelligent approach to study the gene signature of tumour and stroma in different metastatic microenvironments. Using brain, lung and bone xenografts of human breast cancer cells together with HuMu ProtIn array (Affymetrix) she was able to distinguish between tumour (human-derived) and stroma (mouse-derived) gene expression in each environment. Other talks covered the role of AKT-activated vasculature in tumour growth (Shahin Raffi, Howard Hughes Medical Institute New York). The cross-talk between adipocytes and cancer cells (Catherine Muller, Institute of Pharmacology and Structural Biology, Toulouse) and the concept of reprogramming the immune response as a cancer therapy (Lisa Coussens, Deoartment of Pathology UCSF). The afternoon started with "Mechanism-based Anti-metastatic Therapies". Theresa Guise (Indiana University, Indianapolis) discussed her work on HIF1α and TGF-β pathway cross-talk and how it promotes bone metastasis. She demonstrated that in her mouse models inhibition of TGF-β signalling decreases osteolytic metastasis but may accelerate osteblastic bone metastasis. We also heard talks covering stem cell niches in metastasis (Joerg Huelsken, Swiss Federal Institute of Technology Lausanne), hedgehog signalling as a target in cancer (Fred de Sauvage, Genentech Inc San Francisco) and ideas on targeting tumour vasculature (Lee Ellis, MD Anderson Centre University of Texas Houston). The last session on Tuesday was a round table discussion chaired by Manuel Hidalgo from CNIO in Madrid. The idea was for an open discussion based on "Questions from the viewpoint of a clinician" with a panel made up of delegates from the symposium. Topics ranged from screening to models of tumour progression and the hour timetabled for discussion quickly ran out. Fortunately, the second poster session with a further 70 posters allowed discussions to carry on.

The symposium finished with a fascinating session "Angiogenesis and Anti-angiogenic Therapy". Peter Carmeliet's (Katholieke Universiteit Leuven, Belgium) talk showed how vessels in tumours are differentially organised compared to "normal" tissue and how these differences facilitated extra- or intravasation of tumour cells. This raised the potential of the 'normalisation' of tumour vessels as a cancer therapy. Robert Kerbel (Department of Biophysics, University of Toronto, Canada) focused on the frequent discordance between preclinical mouse models and phase III clinical trials. He suggested that the mouse models commonly used to study cancer therapeutics in preclinical trials did not accurately reflect the advanced metastatic disease in clinical trial patients. He presented new mouse models of more aggressive and advanced tumours and showed how treatments developed using these models were more effective in early clinical trials.

We would like to thank to the BSCB for awarding us with Honour Fell Travel Awards which gave us the opportunity to attend this great symposium, present our work and of course, to enjoy the sunshine of Madrid.

Matthew Caley and Mercedes Rodriguez-Teja
Imperial College London

BSCB Summer studentships

2010 saw the third cohort of undergraduate students enter labs to undertake 8 week summer projects funded by the BSCB. These studentships provide valuable experience and the number awarded increased this year to 9 studentships. Details of the 2011 round can be found on the BSCB website, including full details of the application process. The deadline for applications is 30th April.

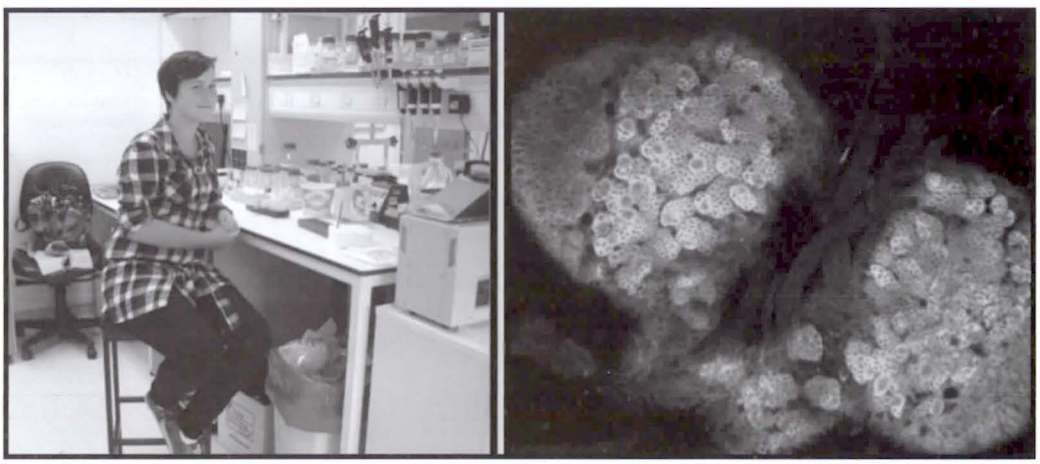
Development of the *Drosophila melanogaster* nervous system

During three months this past summer I enjoyed the opportunity of working in the laboratory of Professor Andrea Brand at the Gurdon Institute, University of Cambridge. The Brand lab is interested in the development of the *Drosophila melanogaster* nervous system.

I learned how to work with *Drosophila* as a model organism, including how to handle different stocks, select virgin flies and properly dissect larval brains.

First, I worked on a project to identify genes that are important for the switch between neural stem cell self-renewal and differentiation. I helped to screen fly lines carrying RNAi constructs to knock out specific candidate genes that might regulate the transition from self-renewal to differentiation. I dissected third instar larval brains and stained with antibodies against Deadpan to mark neural stem cells, and Prospero to mark neural stem cell daughters, which can differentiate into neurons or glial cells. The brains were analysed by fluorescent microscopy, and morphological changes between the various RNAi lines and a wildtype control were documented.

I was able to identify a novel phenotype for one of the target genes that I analysed in the screen. The function of the gene, and the molecular basis for its mutant phenotype, will be investigated at a later date.



Above: A picture of me at my bench (left) and a confocal microscope image of the two lobes of a *Drosophila melanogaster* third instar larval brain (right).

I also worked on a second project, studying the changes in neural stem cell gene expression over time. During the course of development, transcriptional profiles change as a result of the temporally restricted expression pattern of specific transcription factors, such as Hunchback, Kruppel and Castor. The Brand lab's analysis of neural stem cell expression patterns in fly strains lacking each of these transcription factors hinted at novel regulatory interaction cascades. It was my task to test these initial findings by RNA in situ hybridization experiments on fly embryos. I checked for the presence of the transcription factors in mutant versus wildtype embryos. This allowed me to determine whether the cross-talk between the transcription factors leads to inhibition, or activation, *in vivo*.

I would like to thank Professor Andrea Brand for allowing me to work in her lab, Pao-Shu Wu, Dr Anne Pelissier and Catherine Davidson for their supervision and support, and of course the BSCB for their funding of my internship position. I very much enjoyed these three months as they provided me with first-hand experience of research and also a brilliant time with my fellow lab members in Cambridge – which is a really beautiful place to which I hope to be able to return soon.

Julia Oswald Undergraduate within Biochemistry & Cell Biology at Jacobs University Bremen, Germany

The impact of extracellular matrix stiffness on Endo180-mediated prostate cancer cell migration

This summer, I was given the amazing opportunity to work at Dr. Justin Sturge's lab for 8 weeks at Imperial College London. My project focused on the link between extracellular matrix stiffness, the Endo180 endosome receptor, and the migration of prostate cancer cells. It was an invaluable experience, and I learned a great deal of new techniques and skills that I will take with me as I continue my studies in the field of cancer research.

The extracellular matrix (ECM) is a mesh of non-living tissue that constitutes the majority of the connective tissue in our bodies. It plays several key roles, including providing support and anchorage for cells, providing growth factors necessary for cell survival, and allowing for cell signalling via integrins.

To become invasive, carcinomas that arise in the epithelia must first breach the basement membrane and migrate through the stromal matrix, both of which are part of the ECM, before they can enter the blood or lymphatic vessels. Hence, the efficiency at which cancer cells migrate through the ECM plays a major role in invasion and metastasis. Recent research has shown that ECM remodeling and stiffening plays a role in tumourigenesis, particularly, that increasing collagen cross-linking promotes cancer cell invasion via integrin signaling (Levental *et al.*, 2009). This ECM-sensing role of integrins can be extended to other cell surface receptors, and in the case of this project, we were looking specifically at the Endo180 receptor.

The Endo180 endosome receptor is a single-span, transmembrane protein that contains a collagen-binding fibronectin domain. It has been shown that Endo180 has a pro-migratory role in cancer cell migration. For example, Endo180-coated endosomes have been shown to generate Rho-ROCK signaling, that help cells detach from cell-cell and cell-matrix adhesions (Sturge *et al.*, 2006). Furthermore, cells with ectopically overexpressed Endo180 show enhanced cell migration (Sturge *et al.*, 2003).

Given all this information, the aim of my project was to see whether or not a functional link existed between ECM stiffness, the Endo180 receptor, and prostate cancer cell migration.

FIG. 1 PC3-Endo cells on plastic (top), osteoblast- matrix (centre), and fibroblast-matrix (bottom). Cells stained for Endo180 and cell nucleus.

The experimental procedure consisted of two main parts: a migration assay, followed by high-throughput IF imaging of the Endo180 receptor. Prostate cancer cells, including some with ectopic overexpression of Endo180, were tracked over a 24 hour period using time-lapse microscopy on different matrices with varying stiffness. The cells were then fixed, immunohistochemically stained (FIG. 1), and IF analysis was performed to determine the levels of Endo180 on different matrices.

The results showed a clear link between ECM stiffness, the Endo180 receptor, and prostate cancer cell migration, which is very promising for further research in this area. Furthermore, the widespread nature of the Endo180 receptor makes it an attractive and potential therapeutic target to reduce the incidence of invasion and metastasis in cancer patients with early diagnoses.

I would like to give special thanks to Dr. Sturge for giving me the opportunity to work in his lab, and to all the other members of the Prostate Cancer lab, particularly Dr. Matthew Caley who helped train and teach me throughout my 8-week period at Imperial. I would also like to thank the BSCB for providing me with the funding that allowed me to take on this summer research project.

Neel Shah, Undergraduate,
Microbiology and Immunology
University of British Columbia
Vancouver, Canada

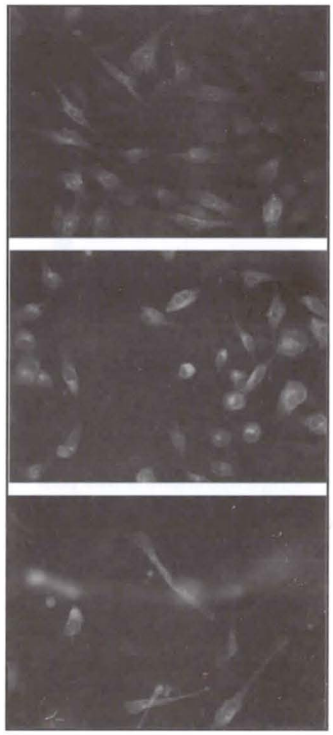


FIG. 1 PC3-Endo cells on plastic (top), osteoblast- matrix (centre), and fibroblast-matrix (bottom). Cells stained for Endo180 and cell nucleus.

References:

Levental, K.R., et al., (2009). Matrix Crosslinking Forces Tumor Progression by Enhancing Integrin Signalling. Cell, 139: 891-906.

Sturge, J., et al., (2006). Endosomes generate localized Rho-ROCK-MLC2-based contractile signals via Endo180 to promote adhesion disassembly. J Cell Biol, 175: 337-47.

Sturge, J., et al., (2003). GPI-anchored uPAR requires Endo180 for rapid directional sensing during chemotaxis. J Cell Biol, 162 (5): 789-794.

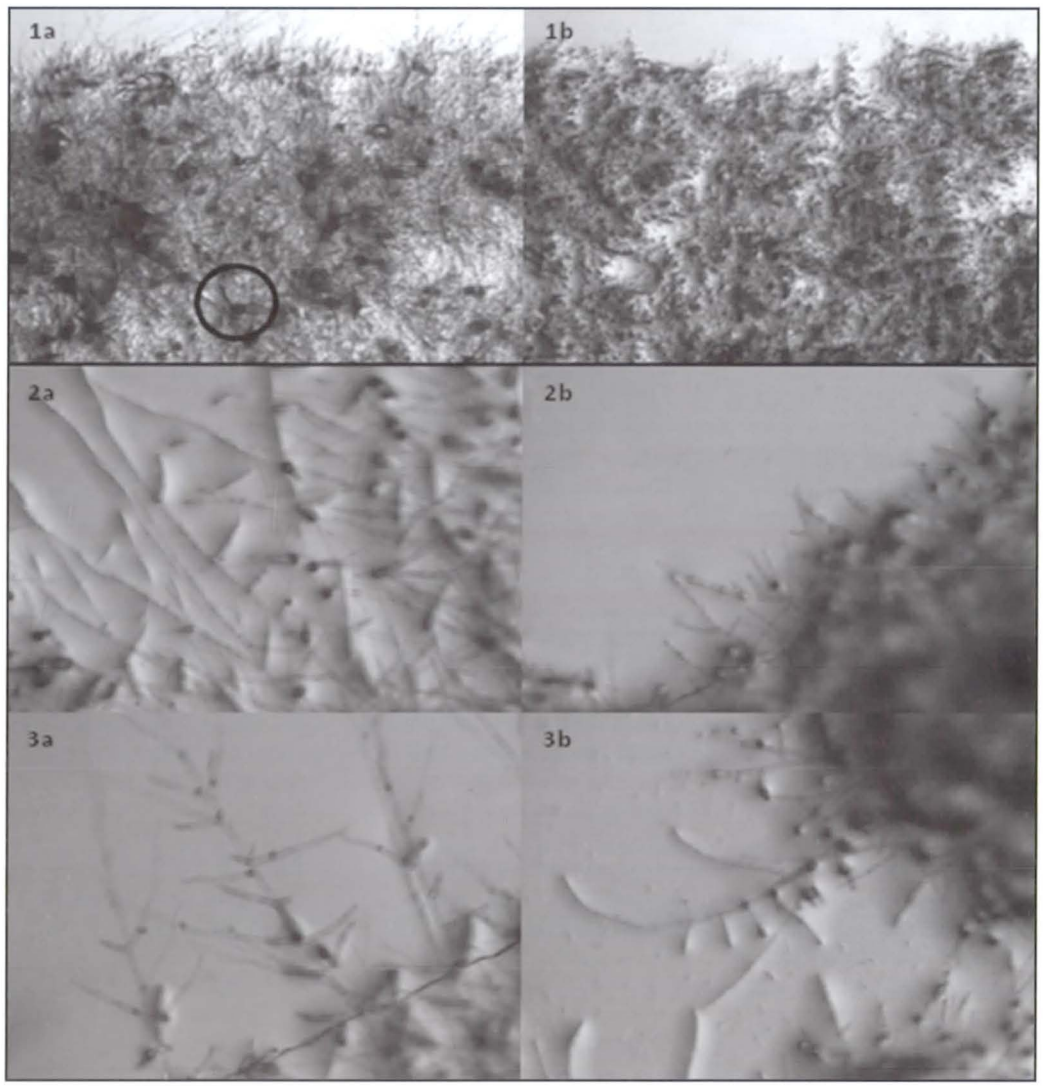
Do moss GSK3s regulate development – and if so, how?

Moss (*Physcomitrella patens*) is an ideal model plant for study as it shows similarity to both algae and flowering plants, and forms a possible evolutionary link between the two. The haploid nature of moss proves useful during genetic analysis and being only a single cell thick makes it easy to view under a microscope.

For my summer studentship I worked in Juliet Coates's lab at the University of Birmingham, alongside an MSc student. The project focused on the expression of GSK3 genes in *P. patens* and the effects of their inhibitors at different concentrations.

GSK3s (Glycogen Synthase Kinases) are enzymes that catalyze the phosphorylation and hence inhibition of glycogen synthase, which is involved in making glycogen from glucose monomers. They are also involved in many cell biological processes including cell signaling, apoptosis, cell division, and cytoskeletal regulation.

There are five known GSK3s in *P. patens* and part of the project dealt with their possible function in these plants. Moss plants were grown on agar growth medium containing different concentrations of LiCl, which is known to inhibit animal, microorganism and flowering plant GSK3s at low concentrations and induce salt stress/toxicity at higher concentrations. Control experiments were carried out using NaCl (which does not inhibit GSK3), LiCl with myoinositol (to rule out effects of lithium on inositol phosphate signalling). Low concentrations (5–10mM) of LiCl changed the ratio of filamentous cell types that grew: an increased amount of chloronemal tissue (photosynthetic filaments) was observed, at the expense of caulonemal tissue (from which leafy gametophores arise) (Figure 1a). As a result of this change in ratio, fewer leafy gametophores developed than in control treated moss (Figure 1b).



Moss growth in 0mM LiCl (1a, 2a, 3a) showing extension of filaments into the agar and presence of gametophores (circled) at 0.8 and 4X magnification respectively, as compared to growth in 10mM LiCl (1b, 2b, 3b) with no chloronema or gametophores.

We aimed to overexpress each of the GSK3 genes to see what effect it would have on moss growth. Genomic DNA and RNA were isolated from moss. GSK3 genes and cDNAs were then amplified using PCR and RT-PCR respectively. This was followed by purification and ligation into a Strataclone vector, which was used for transformation into competent *E. coli* cells. Cells were cultured on growth medium containing X gal and Kanamycin for screening and selection purposes respectively. The vector had the Kan resistance gene, which meant that successfully transformed cells would grow on the plates. Minipreps were carried out for plasmid purification preparation. EcoR1 was used for enzymatic digestion at specific restriction sites on the vector to identify clones that contained the correct insert. The cloned GSK3 genes were then sequenced. The GSK3 sequences were used to design primers allowing the genes to be inserted into moss overexpression vectors, which would be used to insert the plasmid into moss plants for phenotypic analysis.

Working at the Coates lab this summer was both an educational and enjoyable experience. I believe that I acquired not only the critical thinking and analytical reasoning skills needed in scientific research, but also a greater passion for the subject.

I deeply acknowledge BSCB for presenting me with the opportunity to learn more about cell biology. I would also like to thank Dr Juliet Coates, Sue Bradshaw, Younousse Saidi, Laura Moody and Anup Mistry for their help and guidance through the studentship.

Kiran Bansal, Undergraduate, University of Birmingham.

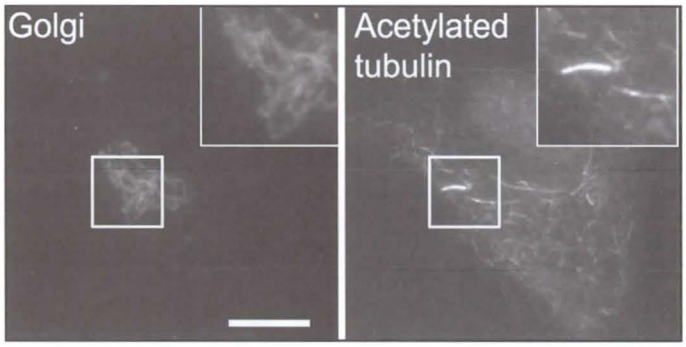
The role of the Golgi in ciliogenesis

Primary cilia are present on most adult human cell types, with key roles in multiple cell signalling pathways, using mechano-sensation and chemosensation. Defects in primary cilia are associated with a variety of human disorders, such as polycystic kidney disease and polydactyly. Assembly of the cilium occurs in the G0 phase of the cell cycle. The centrosomes migrate to a sub-plasma membrane domain of the cell and the mother centriole forms the basal body. This attaches, via transition fibres emanating from the basal body, to a vesicular structure which is hypothesized by some to derive from the Golgi. The vesicle expands with the newly forming axoneme as microtubules polymerize and cargo is delivered via intraflagellar transport within the cilium. The axoneme is the name given to the specialized microtubule array within the cilium; cargo travels in both directions along this by intraflagellar transport. The vesicle eventually fuses with the plasma membrane, exposing the primary cilium to the extracellular space. The cilium continues to lengthen by a few micrometres producing mature cilium. For more details see 1 and references therein.

The transition fibres project from the distal end of the basal body to form a ciliary pore. This allows specific cargo, derived from the Golgi, to enter the cilium. The Golgi protein GMAP210 is required to correctly localise the intraflagellar transport protein IFT20 to the Golgi membrane 2. IFT20 functions to deliver ciliary membrane proteins, from Golgi complex to the cilium. During six weeks laboratory experience within the Stephens Laboratory at University of Bristol, I investigated the role of another Golgi protein in ciliogenesis.

I used RNA interference (RNAi) to inhibit the transcription of the specific Golgi protein, transfecting (retinal pigment epithelial 1) RPE1 cells with different siRNA oligonucleotides using calcium phosphate. siRNA oligonucleotides anneal to different regions of the mRNA for the Golgi protein, associated as RNA Induced Silencing Complex (RISC), causing cleavage of mRNA thus inhibiting transcription. We validated knockdown using immunoblotting and using quantitative immunofluorescence.

After a period of time in media containing 0.2% serum, to arrest the cell cycle in G0 allowing cilia to assemble, cells were fixed and stained for immunofluorescence. The time spent in 0.2% serum media was a measured variable throughout these experiments; comparing the proportion of cells which assembled cilia with 48 hours, or 72 hours. Immunofluorescence confirmed whether the knockdown was successful, and more importantly whether this caused reduced levels of cilia assembly, by identifying any cilia present and locating the Golgi protein. Using indirect labelling I labelled different compartments of the cell. A primary antibody raised in a mouse was produced against acetylated tubulin to visualise cilia (the microtubules within the axoneme are acetylated). The acetylated tubulin primary antibody was used at a dilution of 1:2000, and after an hour of incubation on the cells, unbound primary antibody was washed off and a Donkey Anti Mouse cy3 secondary antibody was used to label the primary antibody and so indirectly the acetylated tubulin. This tag emits red light which is visualised using a wide-field fluorescence microscope, allowing localization of the cilia and other acetylated tubulin within the cell. A second primary antibody was also used; in some experiments the antibody used was raised against the Golgi protein, used to observe the efficiency of the knockdown. In others pericentrin was labelled to locate the centrosomes in images of cell.



Above: Ciliated cell transfected with GL2 siRNA, after 72 hours in 0.2% serum media. Cells were labelled with antibodies to detect the Golgi and cilium (acetylated tubulin). Bar = 10 μm.

Locating the centrosomes of the cell allowed easier detection of cilia or absence of cilia.

Depleted expression of the studied Golgi protein is visualised by decreased immunofluorescence signal from the secondary antibodies compared to control cells. Control cells used were cells transfected with GL2 siRNA (negative control) and IFT20 (positive control) using these siRNAs the cells endogenous levels of the protein remained.

Up to eighty cells per coverslip/condition were imaged, which enabled counting the number of cells with assembled cilia, and a percentage of ciliated cells determined. These values were then compared to control conditions, allowing quantification for reduced rates of ciliogenesis. Figure one shows an image taken of a cell transfected with GL2 siRNA and treated with 0.2% serum for 72 hours. These experiments showed that compared to controls, suppression of expression of the Golgi protein causes a significant reduction in the ability of RPE1 cells to form primary cilia.

I also had the opportunity to carry out a lipofectamine transfection, which involved transfecting RPE1 cells with siRNA against the Golgi protein and a plasmid containing DNA for the Golgi protein fused to the FLAG epitope tag. Antibodies raised against FLAG and the Golgi protein were used to observe levels of the Golgi protein in the cells, which was correlated with the number of ciliated cells. I was also able to be involved with preparing cells for visualisation of the cilia by electron microscopy. The RPE1 cells were grown on sapphire disks before being fixed in liquid nitrogen by high pressure freezing. Unfortunately images were unable to be produced within the time limits of my studentship, but I hope to see the results soon.

Finally I would like to thank David Stephens and Lucy MacCarthy-Morrogh for their guidance and help throughout the studentship which made the experience both enjoyable and a great learning opportunity. I would also like to thank the British Society for Cell Biology for their generous support in the studentship.

Gayle Bishop, Undergraduate, University of Birmingham

1. Satir, P., et al. (2010) J Cell Sci 123, 499-503.
2. Follit, J.A., et al. (2008) PLoS Genet 4, e1000315.

BSCB postdocs

Hello fellow postdocs

Iman van den Bout

I am at that 'fabulous' part of a scientific career – being a postdoc. Through convergence of circumstance I applied for the position of postdoc representative at the BSCB and the committee, in their infinite wisdom, deemed me suitable for this position, for which I thank them.

A little bit of background is in order, I think. I am currently a postdoc in the lab of Nullin Divecha in Manchester working on phosphoinositides and their role in cell migration. I did my PhD in Amsterdam in the lab of Arnoud Sonnenberg working on integrins. I grew up in South Africa where I did my undergraduate studies.

The postdoc representative position was created to give you, the postdoc, some representation within the BSCB structure. While this is important I feel it needs to be given some shape or form now so that this can truly work for us. To do this I would like to know if and how you feel the BSCB could be helpful to you. To this end I will be sending a little questionnaire around to all postdocs to get some ideas. I hope you will help me with this by responding to it.

One thing that has already been pointed out to me, and where we can help, is to get some web resources for postdocs listed on the BSCB website so that you can have an easy one-stop spot to go to for help with these. These will include sites discussing help with figuring out where and how to get that next position, how to write grants etc.

Of course, I would also very much like to hear from you if you have any ideas to help postdocs within the BSCB. I would also like to remind everyone that we have a Facebook page that can be used for discussion etc.

Lastly, I hope I will see many of you at the BSCB Spring Meeting in Kent. Till then,

Iman van den Bout, Paterson Institute for Cancer Research, University of Manchester
IVBout@picr.man.ac.uk

Postdoctoral Life in Singapore

Lux Fatimathas

Singapore, a food-obsessed city of shopping, half the size of Greater London and renowned for its law and order. But what about its science? Singapore does not immediately come to mind as the destination for a newly qualified post doctoral researcher, but this is where I headed following my PhD at UCL.

This island nation has spent the past decade funding a venture to become a global research hub. Much of this energy has focussed on the construction of Biopolis, the science park where I work. This miniature metropolis resembles a futuristic cityscape, minus the traffic, noise and dirt. Amongst imaginatively named buildings such as Proteos, Nanos and Matrix, Biopolis harbours numerous food outlets and coffee shops, as well as a pub, a dry cleaners and a childcare centre. Convenience accurately describes the ethos of Biopolis. This is also true when it comes to scientific facilities, with microscopes galore, DNA sequencing in hours and even a monoclonal antibody unit, all on site.

An abundance of funding has meant Singapore can live up to its exercise in PR when it comes to the availability of scientific technology. In order to capitalise on the tools at their disposal, the government has spent the past decade filling this fully functional science park with scientists from across the globe. As a result the various institutes comprising Biopolis are staffed with researchers not only from Asia, but Australia, Europe and America. That said, the scientific community here is much smaller than in established centres like the UK. This burgeoning community however continues to attract an increasing number of eminent scientists, both to stay and set up labs and to visit and disseminate their work. I was in fact surprised to find that almost every week there would be seminars from speakers hailing from Europe and America who had made the long journey to Singapore.

When it comes to the daily task of doing experiments, the practicalities of life in a Singaporean lab are rather easy as equipment and reagents are easily accessible. The labs are generally staffed by a mix of people; expats make up a significant contingent of lab heads and post docs, whereas students and technicians are generally locals. The work ethic and environment is none too different from the UK. The greatest difference I have noticed is a subtle feeling that hierarchy is of more importance here. However, overall it turns out that whichever hemisphere you work in, lab life

is surprisingly immutable. Strange comfort can be found in the fact that whilst you may be thousands of miles from home, you are using the same kit and following the same protocol, just in a different time zone.

Lab life aside, socially there are more obvious differences. Top of the list comes food. Singapore is known to be a food-obsessed country. Everywhere you turn you are likely to find a hawker centre stocked with cheap and tasty Eastern delights. Eating out is the norm here, so the notion of a packed lunch is almost unheard of. Perhaps surprisingly, language only ranks second on the list of differences. Singapore has four national languages; Mandarin, Tamil, Malay and English. You will find that everyone speaks English, in and out of the lab. Although outside of the lab you are more likely to encounter Singlish (Singaporean English), a strange slang adopted by all the locals. Take a couple of trips in a taxi and you will soon start to pick it up!

Hopping in and out of taxis, shopping well past six in the evening, and being able to pick up a cheap and tasty dinner at any time of the day or night, are all differences that are quite easily adapted to. A postdoctoral salary certainly feels like it goes a lot further here, with most post docs able to afford their own one or two bedroom apartment. The city is bustling with enough going on to keep most people entertained and a strong expat community to enjoy it with. This all makes life in science and life in Singapore a combination worth trying.

Lux Fatimathas, Institute of Molecular and Cell Biology, Singapore (and currently at the Mechanobiology Institute, National University of Singapore).

BSCB PhD students

A New Year = A New You?

Jay Stone

I am guessing by the time you read this it will be sometime in March 2011? Maybe you'll have registered for the BSCB/BSDB conference in Kent next month and I'll see you there!

Despite whatever time of year it is now, I need to take you back to the end of 2010. All article submissions have to be thought about months in advance and the ideas for this newletter's contribution began to cultivate in my mind late November last year.

I had finally surrendered to the idea of being a final year PhD student and had excitedly began to think about the prospect of 2011 being the year I could become 'Dr. Stone'. Obviously I still had a lot to do before then but as long as I planned my time well there is no reason why my final year had to be hell... right?

The problem arises when I confess that I am not the most organsied person you could meet... I mean I can do what I need to do when it should be done but it is not always a smooth affair. Ask any of my friends and they would tell you that my flat looks neat and tidy until you open a cupboard and get buried under countless assortments of things I have not found a home for yet.

So, to reach my thesis deadline, while still being able to have a life outside of the lab (and keep all of my hair) I knew I needed to address this personal weakness.

2011 was fast approaching and there is something about a New Year that makes it feel like you can have a fresh start. The previous year is a distant memory so mishaps can be forgotten and the slate wiped clean. It is the ideal time for self reflection and improvement so I decided to get myself sorted and declare 'Not letting my thesis govern my life' as my New Year resolution.

I don't often set myself a New Year target; I can never think of anything specific enough... and I worry they set me up for failure. But apparently it is estimated that 46% of people who set themselves a New Year aim will stick to them for at least 6 months. Also you are 10x more likely to achieve your goal if you tell people you have set it (I have no excuse now as you all know!).

Armed with these new statistics and an unfaultering festive ethusiasm I emailed all members of the BSCB (You may remember reading and/or deleting it) asking what you were planning to aim for in the New Year.

I told you all that it didn't have to be work related, your targets could be big, small, serious or silly it didn't matter just as long as you were willing to declare it in the newsletter. I also invited people to send their photos of their despair, attempts or visions of success.

The responses were a little slow to come in at first (I am assuming last minute Christmas shopping and the endless office parties got in the way) but I did get quite a few emails back by mid January. Obviously I can't list all of them so I have just picked a few to share with you:

Prof. Robert Insall (Glasgow) – "I am going to get back on the microscopes and look myself, rather than waiting for my postdocs to bring me data"

Kimberley (London) – "I want to try and sort my lab book out so it actually makes sense!"

Ben (Newcastle) – "I am hoping to get my Western blot data to $n=3$ this year"

Mike (Oxford) – "I really need to start writing that paper I have been putting off for ages"

I want to thank everyone who got involved and wrote back to me. I hope you are all still full of determination or have maybe even achieved your goals by now. I also think it is worth remembering that even though the New Year is an ideal time to reassess, take stock and set yourself some targets it doesn't mean it is the only time you can do it. If 2011 is not going as you thought, maybe try and set yourself an early year resolution... with the 46% 6 month rule that would take you near to 2012 in time for the next round!

BSCB Calendar of Meetings

BSCB Meeting

BSCB Autumn meeting 2011
Cell Biology of Protein Degradation Pathways
11–13 September 2011
Greenbank Conference Park, Liverpool
Organising committee: Michael Clague, Sharon Tooze, Sylvie Urbé

Check www.bscb.org for full details.

Related Meetings in 2011

7–11 May
EMBO Workshop: Cell biology of the neuron
Heraklion, Greece
www.embo.org

25–28 May
Cell Cycle, Cancer and Development
Saint Malo, France
cccd-2011.univ-rennes1.fr/

31 May–1 June
New Frontiers in Persistent Pain
Paris, France
www.abcam.com

5–10 June
Gordon Research Conference on Tissue Repair and Regeneration
Colby-Sawyer College, New London, NH, USA
www.grc.org/programs.aspx?year=2011&program=tissuerep

27–29 June
Advances in the cellular and molecular biology of angiogenesis
University of Birmingham, UK
www.biochemistry.org/tabid/379/MeetingNo/SA123/view/Conference/default.aspx

3–6 July
Cancer Models and Novel Therapies - Beatson International Cancer Conference
Beatson Institute, Glasgow, UK
www.beatson.gla.ac.uk/Conference.html

13–15 July
Nuclear envelope disease and chromatin organization
Robinson College, Cambridge, UK
www.biochemistry.org/tabid/379/MeetingNo/SA125/view/Conference/default.aspx

17–22 July
Gordon Research Conference on Apoptotic Cell Recognition and Clearance
Bates College
Lewiston, ME, USA
www.grc.org/programs.aspx?year=2011&program=apoptotic

6–11 August
International Gap Junction Conference
Ghent, Belgium
www.ugent.be/ge/mbw/en/igjc/en

21–26 August
Gordon Research Conference on Angiogenesis
Salve Regina University, Newport, RI, USA
http://www.grc.org/programs.aspx?year=2011&program=angiogen

10–13 September
The EMBO Meeting 2011
Vienna
www.the-embo-meeting.org/

13–15 October
EMBO/EMBL Symposia:
Structure and Dynamics of Protein Networks
Heidelberg, Germany
www.embo.org

Honor Fell/Company of Biologists Travel Awards

Honor FellTravel Awards are sponsored by the Company of Biologists (the publishers of ***The Journal of Cell Science*** and ***Development)*** and they provide financial support for BSCB members 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 **£300** for UK meetings (except for BSCB Spring Meeting for which the full registration and accommodation costs will be made), up to **£400** for European meetings and up to **£500** for meetings in the rest of the world.

The following rules apply:

- Awards are normally made to those in the early stages of their careers (students and postdocs)
- Applicants must have been a member for at least a year (or be a PhD student in their first year of study).
- No applicant will receive more than one award per calendar year and three *in toto*
- The applicant must be contributing a poster or a talk.
- Members who are based outside of the UK **can only** receive funds to attend BSCB-sponsored meetings in the UK.
- **No lab may receive more than £1000 per calendar year.** ***Awards are discretionary and subject to available funds***

All applications must contain the following:

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

(See additional comments at foot of page)

Applications should be sent to:

Ewald Hettema
Dept. of Molecular Biology and Biotechnology
University of Sheffield
Firth Court, Western Bank, Sheffield S10 2TN

Application for Honor Fell/Company of Biologists Travel Award

Please complete, print out and send to Ewald Hettema at the address above together with supporting information

Full name and work/lab address:

Email:

Age: BSCB Memb. No:

I have been a member for years

Years of previous Honor Fell /COBTravel Awards:

Degree(s) (dates):

Present Position:

Meeting for which application is made:
title/place/date:

Expenses claimed:

Travel:

Accommodation:

Registration:

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

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

My lab has not received more than £1000 in Honor Fell/ COB Travel Awards during this calendar year

Signature:

Name:

Applicant's Signature:

Name:

§ > If proof of payment for ALL costs claimed is available at the time of application, successful applicants will be awarded a grant in advance of the meeting

> If proof of payment for ALL costs is not available at the time of application, successful applicants will be awarded a provisional grant and a cheque will be sent when BSCB have received the receipts.

> Incomplete applications will not be considered.

Have you included all the necessary information/documentation in support of your application?

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The BSCB newsletter is published twice a year.

Submission
If you have an idea for an article please e-mail the editor a brief outline first.

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

Attachments for text can be in txt, rtf or doc format. Please send images as 300dpi JPEG, TIFF or PSD files.

Submission of articles and images should be made to

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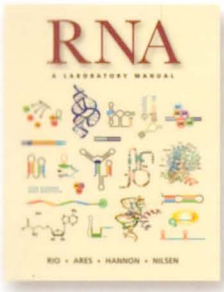

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By Donald C. Rio, Manuel Ares, Jr., Gregory J. Hannon and Timothy W. Nilsen

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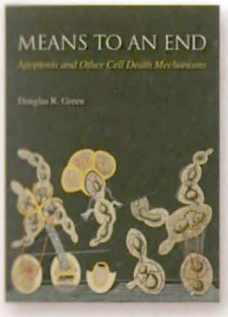

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By Douglas R. Green

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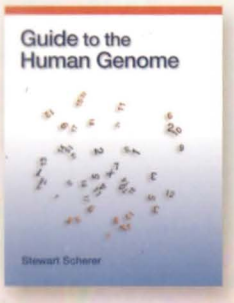

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By Stewart Scherer

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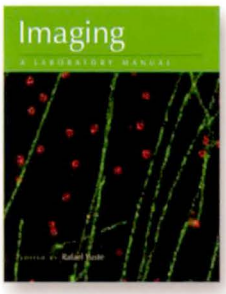

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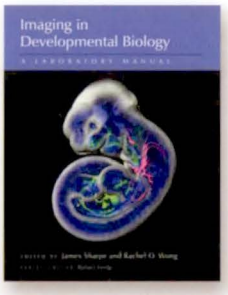

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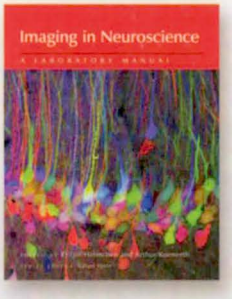

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