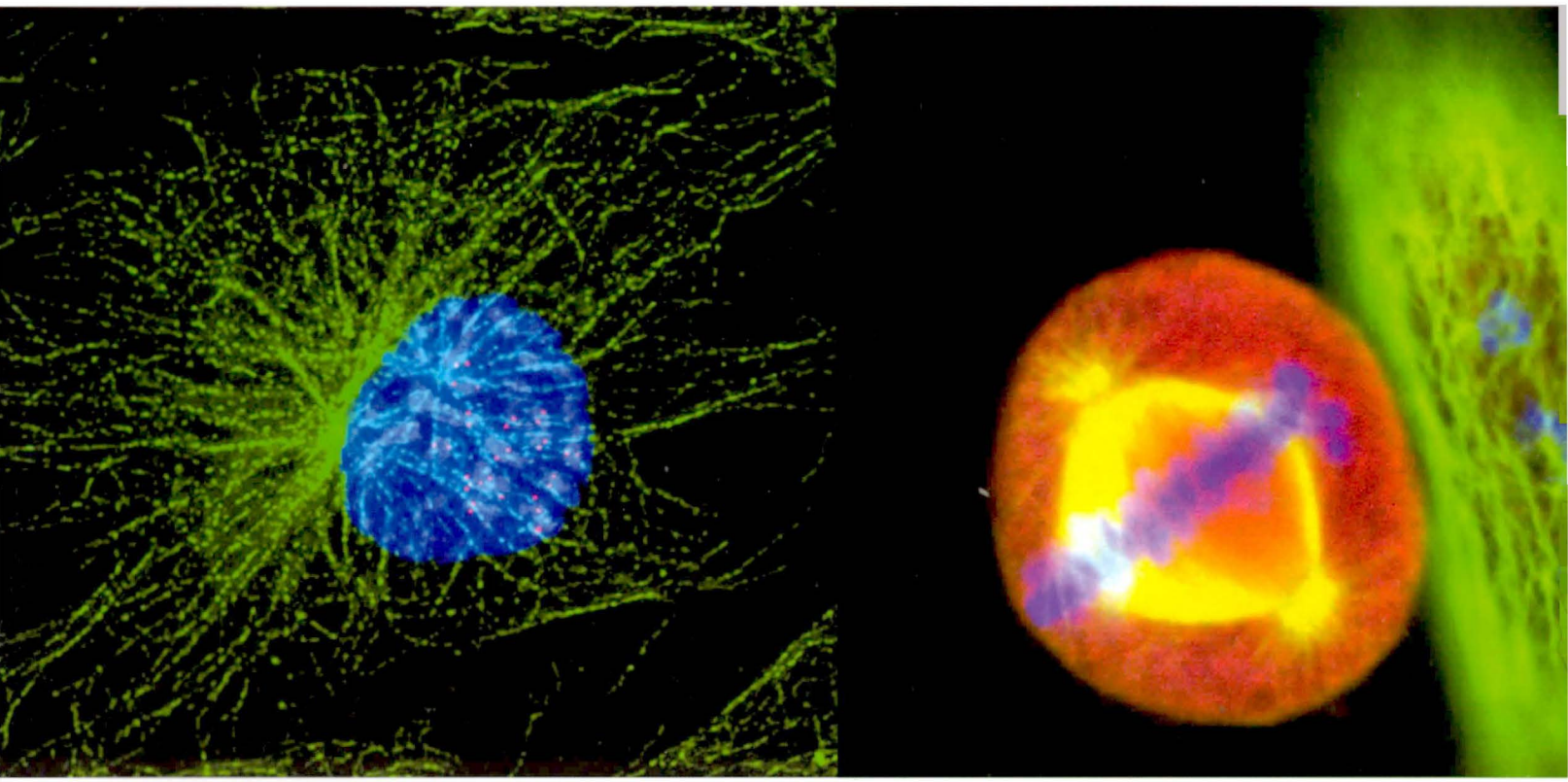

# BSCB Newsletter

## Winter 2001

British Society for Cell Biology

# BSCB Newsletter
# Winter 2001

*Editorial*

The last six months has been a time of mixed emotions for many associated with cell biology in the UK. In May we learned of Alan Wolffe's tragic death in Brazil. Alan was two years 'above' me in Jam Tata's lab at Mill Hill, where we were both studying for our PhDs. Alan was obviously a star then, but he was also a great friend, always ready to have a joke, often at the expense of colleagues, but never unkindly meant, or taken. Alan was also always willing to help, even with someone as technically incompetent as me – it's no coincidence that I now work with a keyboard rather than a pipette. A tribute to Alan from Jam Tata appears in this issue, kindly reproduced from the *Journal of Cell Science*.

On a happier note, I was delighted to hear that this year's Nobel Prize was awarded to Tim Hunt and Paul Nurse, together with Lee Hartwell. Tim was my undergraduate supervisor at Cambridge and, again, never fully despaired of my impracticality. He has also remained a great friend and supporter throughout my career. He and Paul are both inspirational characters and we are fortunate to have them as members of the British cell biology community.

*The Editor*

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http://www.bscb.org

Front cover: Left: A prophase PtK2 cell stained for kinetochores, microtubules and DNA. Courtesy of Bill Earnshaw, University of Edinburgh. Right: HELA cell stained for anti-phosphohistone H3 (green), CREST serum (blue) and anti-CENP-E (red). Courtesy of Tim Bradbeer, Wellcome/CRC Institute, University of Cambridge.

*Contents*

# News

## BSCB Meeting for Martin Raff
## September 2001, University College London

This meeting was postponed because of the terrorist attacks in New York and Washington. The meeting will now take place at University College London on July 3-5, 2002.

The majority of speakers on the programme for September have agreed to speak at the rescheduled meeting in July. The programme will therefore be essentially the same as previously advertised and all venues are rebooked, including the Hotel Russell for the Meeting Dinner on July 4.

Further information about the July meeting, including the Programme, is on the BSCB website (www.bscb.org). Information can also be obtained by e-mailing B.Plettenberg@ucl.ac.uk.

The Meeting Organisers, Anne Mudge, Ben Barres and Bill Richardson, hope that most delegates who intended coming to the September meeting will instead come in July. They also urge you to sign up for the meeting dinner, which they say promises to be a lively affair.

## Cell biologists win Nobel prize...

Everyone will have been delighted that the Nobel Committee chose to recognise the pioneering work done in the basics of cell replication and division by awarding this year's prize in Physiology and Medicine to Sir Paul Nurse, Tim Hunt and Lee Hartwell.

Many members of the Society will be familiar with Paul (pictured left) and Tim, who are prominent members of the UK biological community. The cell cycle may now be a very trendy area of research, but it was not always so. What were these obscure proteins called cyclins really doing and who wanted to work on a yeast that Paul himself once described as 'black sludge'?

# and a host of other awards...

## Lasker Awards

Another British biologist is one of the winners of this year's Albert Lasker Medical Research Awards. Martin Evans, now at the University of Cardiff but previously at the Wellcome/CRC Centre in Cambridge, shares the prize with Mario Capecchi (University of Utah) and Oliver Smithies (University of North Carolina) for work on the technology used to create transgenic mice for disease research. The clinical research award went to Robert Edwards of the University of Cambridge for his development of *in vitro* fertilization.

## Peter Gruber Foundation prize for Genetics

The first award of this prize has gone to Rudi Jaenisch (Whitehead Institute for Biomedical Research, Cambridge, USA) for his work on gene transfer in mice. Rudi is credited with developing gene mutations in mice that make it possible to study a variety of human diseases in these animals.

## ASCB Women in Cell Biology Award

Laura Machesky (University of Birmingham) is to receive the Junior award for her work on the Arp2/3 complex, its role in actin filament assembly, organization and function. She will be presented with her award at the Annual Meeting in Washington in December.

# Cheaper journal subs for members

Did you know that BSCB members are entitled to discount subscriptions for several journals? The money saved more than compensates for your membership fee, so encourage your friends to join the Society. Details are on p 28.

Next year, for the first time, the scheme includes *The Journal of Cell Biology*. Members wishing to take advantage of this offer should go to www.jcb.org/subscriptions/member.shtml

## Christmas Lectures at the Royal Institution

This year the Christmas Lectures will be celebrating their 175th anniversary with presentations by Sir John Sulston on The Secrets of Life. In the mid 1820s Michael Faraday, a former Director of the Royal Institution, initiated the first Christmas Lecture series at a time when organised education for children was scarce. He presented a total of 19 series and established an exciting new venture of teaching science to children and himself as the outstanding scientific lecturer of the time.

The lectures are televised by Channel 4 and will be broadcast during the Christmas period.

## Big names at Spring Meeting

The programme for the Spring Meeting in York is complete and shown on p 24. The speakers for our sponsored lectures will be:
Borden Lecturer (Garland Publishing): Larry Goldstein
ICRF Lecturer: Bob Goldman
Yamanouchi Lecturer: David Glover

The Society's own Hooke Medal winner, Andrea Brand, will also be speaking.

# Changes on the BSCB committee

The Treasurer of the Society, Jo Adams, has done a magnificent job since taking over at the beginning of the year. Jo is moving to the USA, so Mark Marsh from UCL has kindly agreed to take on the task of Treasurer. We are very grateful for all that Jo has done in her short time in office.

# New recruits required!

We will need two new committee members to be elected at the AGM in York. Please note that any BSCB members can nominate themselves or fellow cell biologists for election to the committee. Each person should have a nominator and a seconder. We are looking for committee members who represent a good spread of interests and geographical location and who, above all, will make a positive contribution to the running of the BSCB. Nominations should be sent to the BSCB Secretary, Michael Whitaker, and are welcome throughout the year. Committee meetings are held at the Spring meeting, then once or twice more during the year. The current committee members are shown on p30–31.

# Honor Fell Travel Awards

Young BSCB members attending scientific conferences relevant to cell biology are eligible to apply for financial support in the form of an Honor Fell travel award. Last year, thanks to a generous donation from the Company of Biologists, the funds available were increased, allowing more members to benefit from this scheme. Full details are on the application form on p27.

## Erratum

In the June newsletter, I accidentally omitted one of the contributors to the Spring meeting report. Barbara Behrendt was a co-author of the article on the Regulation of Cell Motility workshop.

# Annual General Meeting

6:30 pm Friday 22nd March 2002
University of York

# Agenda

Apologies
Minutes of the last meeting
Changes to constitution
Election of new committee members
President's report
Secretary's report
Treasurer's report
Meetings Convenor's report
Any other business

# Changes to Constitution

These changes to the Society's Constitution will be voted on at the AGM:

3. The Officers of the Society shall be a President, a Secretary, a Treasurer, a Meetings Convenor, a Membership Secretary, a Newsletter Editor and a Website Co-ordinator.
*[Replaces Publications Convenor and recognises the importance of the Society's web site]*

7. The Members of the Executive Committee shall be elected for three years, in the first instance, with the possibility of renewal for a further three years. A member of the Committee who fails to contribute to the business of the Society may, at the President's discretion, be asked to step down.

8. President, Secretary, Treasurer, Meetings Convenor, Membership Secretary, Newsletter Editor and the Website Co-ordinator may be re-elected by the Executive Committee, subject to approval at the next AGM, for a second term of office of another three years. They shall then not be eligible for re-election to the same office for one year, but they shall be eligible for any other office in the Society.

9. Each year the two ordinary members of the committee senior in order of election and having completed their term shall retire from office and shall not be eligible for re-election for one year.
*[Redresses inconsistencies in constitution, ie 12 ordinary committee members, three year term, two to retire each year; allows President to replace committee members who for any reason are unable to give their time to the Society]*

*Michael Whitaker, Secretary*

# Schools news

## The New Lacquered Cross

When I was a small boy, my mother took me to church each Sunday morning. Over the many Sundays I learnt a great deal. I learnt about tree rings and patterns of growth through my observations of the wooden pews. About how the knots in the floorboards were produced and what the kneelers were stuffed with. On one particular Sunday, a new Processional Cross was dedicated. "Why" I asked, "did the new cross not look as bright as some of the old polished brass in the church?" "You had better ask the Vicar," said my mother and to her embarrassment I did, as we left the church.

"Well," said the Vicar, "we had the brass cross lacquered to keep it attractive without the need for endless polishing. In time, people will accept that lacquered brass is different but that it is still brass, only its surface has changed."

I was reminded of this event when the annual 'A' level standards volcano erupted in August. We need to understand that the 'gold standard' of 'A' levels has changed. It is no longer a dazzling object to be acquired by a few, but a lacquered version that can be acquired by many. And this is how society, or was it just central government, wanted it to be. Society wanted more young people to have access to tertiary education; we wanted a positive admission system that would include many, not a rejection system that would exclude most.

Many scientists pleaded for a more general education for students up to the end of first year of 'A' levels, or equivalent, so that students were not pushed into the arts versus science decision before they had really tasted more advanced studies. Some of the items from 'wish lists', but perhaps not your wish list, have been granted. There are problems to be sorted but I think we should give the new AS and A1 ('A' levels) system (outside Scotland) time to settle before we pass judgment on this or, more importantly, on whether the students are 'as good as they used to be'.

If we accept that the gold of the standard has been lacquered, that many more candidates are presenting with good 'A' level grades and that there are more university places available, two issues arise. The first concerns attracting students to your university and course and then, assuming you are overwhelmed with applications, selecting those with the greatest potential.

Those of you involved with Open Days and interviews will know more about this than the writer. From the schools' point of view, however, I should flag that what may be a tedious day to you will probably be one of the most important in the life of each student. The decision could make or break their studies and probably their career. Just think back a few years!

So how can you identify those who have the qualities and potential to become good cell biologists? The AS level course contains some cell biology, therefore a candidate's AS level results may be of some extra help, but an interview, or an interview plus task, will probably be the most useful instrument. It is rather ironic that at a time when pupils are given more tests than ever before, the interview will not lose its value.

*David Archer*

**UKLSC Education Group**

The BSCB has contributed to the work of this group by (1) commenting on and suggesting alterations to the new Salters-Nuffield Advanced Biology syllabus; (2) checking and adding information for a 'School Science Year' booklet published by another group; (3) contributing to the 'Review of the Supply of Scientists and Engineers' (Sir Gareth Roberts' review) and (4) commenting on the layout of the new edition of the UKLSC leaflet 'Biology a subject for life', and ensuring that cell and molecular biology and the BSCB are listed in it.

# Proposed Biosciences Federation

Louise Cramer and Robert Insall attended a meeting in October on behalf of the BSCB. The meeting had been called, and the federation proposed, by a working group of about 12 bioscientists from a wide range of disciplines.

The meeting was opened by Lord Selbourne, who spoke strongly in favour of a unified society, on the grounds that biology was being sold short by the government because of the lack of a consistent voice. The working committee described their proposal, which was based around a federation that would not detract from the original societies, but provide a consistent and higher-level voice, without producing excessive extra bureaucracy.

This was followed by a lively debate. The main themes were a clear realisation that the proposal was not nearly ambitious enough to be able to achieve anything and questions as to whether any kind of federation could achieve enough to be worth the money and effort.

The organisers have returned to planning something with more aggressive aims, to refer back to the learned societies in due course. As far as the BSCB is concerned, this kind of federation could offer advantages and disadvantages.

The advantages include the possibility of a more coherent voice and more political clout, achieved by bringing together a larger number of bioscientists and thus being able to call on more resources. Such an organisation could provide lobbying, influence and information, especially on vexed subjects like animal research and transgenic crops.

The disadvantages of the proposed model include an extra layer of committees and bureaucracy, and the likely enfeeblement of the resulting federation by inertia, querulous small organisations opposing important measures, and the difficulty of recruiting influential enough scientists given the small amounts of money proposed.

Louise Cramer and Robert Insall

Any comments on the proposed Biosciences Federation should be sent to Louise, Robert or Michael Whitaker (addresses on pages 30–31).

# Alan Paul Wolffe (1959-2001)

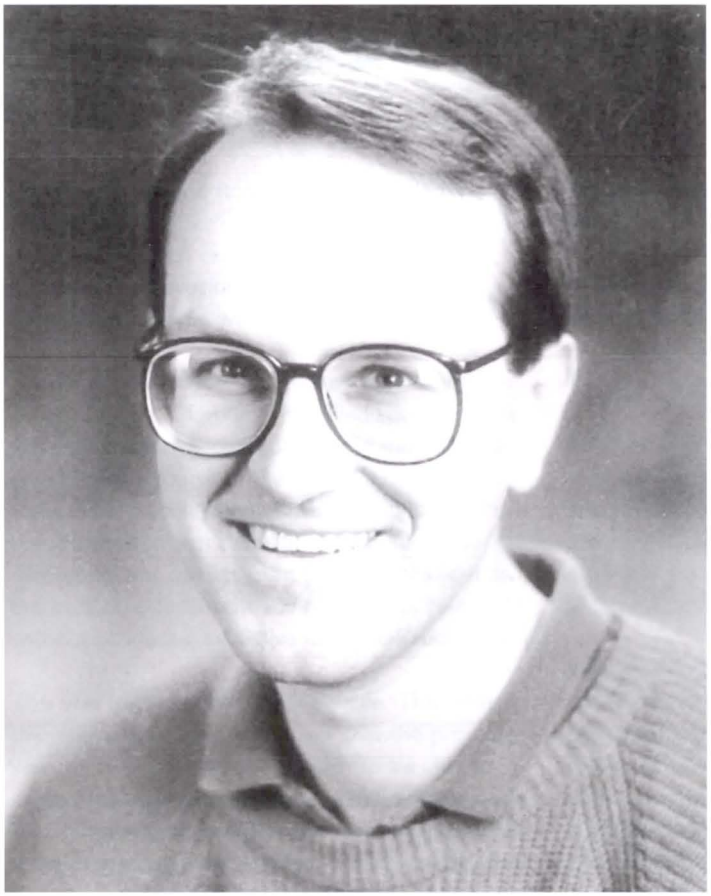
*Alan Wolffe, who died at the age of 41 on 26th May 2001 in a road accident in Rio de Janeiro, was a leading cell biologist interested in the structure and function of chromatin. He was renowned for his pioneering demonstration that the chromosomal organisation of genes is a dynamic phenomenon determining their expression, cell division and differentiation. He was a prolific writer, an engaging speaker and the leader of a large research group.*

Alan was born on 21st June 1959 in the Staffordshire town of Burton-on-Trent, where he grew up until finishing school at the age of 18. He was already attracted by biology and was awarded the Biological Council Prize upon leaving Pingle School. Having obtained entrance to Oxford University, he graduated with a first class B.A. degree in 1981. Under the influence of his tutor at university, the late Dr. Ian Walker, he became interested in DNA-histone interactions, which must have sown the seeds in Alan's mind as to how genes are organised within the nuclear structure, an area of research which he was to pursue with great passion throughout his postdoctoral research career.

I first met Alan when he was 20 and had come to spend a few weeks as a summer student in my laboratory in the then Division of Developmental Biochemistry at the National Institute for Medical Research in London. This was a great success since he returned the following summer before continuing as a PhD student with me. Summer students are usually given trivial jobs, often to plug holes in the work of postdocs or PhD students writing up their thesis. Alan was not one to be satisfied with such 'boring' activities and insisted on participating in the ongoing work of the group on the hormonal regulation of egg protein genes in the frog *Xenopus laevis*, an organism of choice for the rest of his life. His first PhD project was to refine the preparation of primary hepatocyte cultures in order to activate with oestrogen the silent vitellogenin genes in male *Xenopus* hepatocytes. A simple 'trick' that allowed the cells to recover from heat-shock proteins produced in the initial period of 'culture shock' enabled him to optimise the vitellogenin gene induction system *in vitro*. Seven full publications in major journals resulting from his PhD thesis work made certain that Alan would have no difficulty in finding a prestigious American lab in which to embark on his postdoctoral training.

The award of an EMBO long-term postdoctoral fellowship in 1984 led Alan to the laboratory of Donald D. Brown at the Department of Embryology, Carnegie Institution of Washington in Baltimore. At that time Brown's group had been exploiting the differential expression of 5S RNA genes in *Xenopus* oocytes and somatic cells, a system that lent itself exquisitely to identifying the structural elements underlying the developmental switch for selective expression within the same family of genes.

In a series of papers with Brown, Alan established the relationship between a number of important structural features and the transcription of 5S RNA genes, such as negative supercoiling, their



interaction with transcription factors and nucleosomal organisation. At the end of this fellowship, he moved a few miles away to the NIH in Bethesda to work with Gary Felsenfeld in the Laboratory of Molecular Biology (National Institute of Arthritis, Diabetes and Metabolic Diseases), whose work on chromatin structure is well renowned. Enjoying the freedom and resources offered by the NIH, Alan focussed his efforts on the role of histones in the functional organisation of nucleosomes, in particular the importance of histone acetylation in the activation and silencing of transcription. His interests in gene expression during development led him to Igor Dawid's lab at the National Institute of Child Health and Development. This move was in fact a stepping stone towards his appointment in 1990, at the age of only thirty, as Chief of the newly founded Laboratory of Molecular Embryology (LME), a position he held for the next ten years.

During this period, when the LME grew to nearly 45 members, there followed a most extraordinary outpouring of research and new ideas, a period that also established Alan as a leader in the area of chromatin research. Rather than list all his publications chronologically, he preferred to group them into three major areas of his research. The most substantial of these was the work on the dynamic nature of the roles played by histones and nucleososmes in transcription. Starting with his work on the *Xenopus* 5S RNA genes, his group extended their studies on nucleosome assembly and transcription factors to a number of other genes, which, interestingly, included the transcriptional activation by oestrogen of one of the *Xenopus* vitellogenin genes, a system he had worked on as a PhD student.

During the 1990s the Wolffe lab became increasingly aware of the importance of histone H1 acetylation for the incorporation of transcription factors during chromatin assembly and how this would affect the processes of transcription and replication. This period also coincided with the rapidly growing recognition throughout the chromatin community of the central position occupied by histone acetlylases and deacetylases in the concept of co-activators and co-repressors, particularly important for zinc finger transcription factors.

In many of their studies on nucleosome and chromatin assembly the Wolffe lab very judiciously exploited frog egg extracts, which also proved to be particularly valuable for the work on Alan's other areas of interest, namely gene expression and nuclear organisation of transcription. It is impossible to mention all their contributions in these areas, but worth noting are their papers on histone phosphorylation, remodelling of sperm chromatin in *Xenopus* egg extracts, a recognition element within the structure of the nucleosome for thyroid hormone receptor (a zinc finger protein) and how histones are assembled into chromatin in early *Xenopus* embryos. Towards the end of this most fruitful period at the NIH, Alan was becoming increasingly involved with transcription factors, such as Y-box factors, in the context of the higher order organisation of the cell nucleus.

Alan's departure from the NIH last year to take up the position of Senior Vice President and Chief Scientific Officer at Sangamo, Biosciences, Inc., came as a surprise to many of us. He wrote to me recently to explain his move simply as "having run a department for a decade – 40 seemed a good

time to move on". Sangamo is a California biotech company with major interests in novel transcription factors for the regulation of gene expression. Only a few weeks before his death, he wrote to me enthusiastically about his future plans for working on zinc finger proteins and chromatin and that he was actively building up a new group around him for just that purpose. Sadly, his dreams will remain unrealised.

Most remarkably, Alan had authored 260 publications, most of them original research papers in 'high impact' journals, but also many reviews and two books on chromatin. Being such a prolific writer was one facet of him being a great communicator. He enjoyed attending meetings and loved debates where his encyclopaedic knowledge would soon become evident to all. No wonder he was in great demand to attend national and international conferences. Unfortunately, this imposed an enormous amount of travelling. It is therefore even more remarkable that he was always 'on the ball' about what was going on in his large lab. With the reputation that he had acquired, Alan continued to receive a stream of job offers from the most prestigious of universities and research institutions. He was also invited to join the editorial boards of several cell and molecular biology journals, scientific societies, grant committees and governing bodies of research foundations. He was an active member of the Editorial Board of the *Journal of Cell Science*. Few have accomplished in a long lifetime what Alan did in barely twenty years.

Ever since his days as a PhD student in my lab I don't recall Alan saying that any problem would be too difficult to solve nor to waste any time to get moving with a new project. Even as a busy PhD student he was always ready to help others around him, especially those having difficulties with their research, and always with that wonderful smile of his. No wonder he made innumerable friends - friendships that he nurtured throughout his life. Alan was frequent visitor to the U.K., when he would make every effort to visit his old lab at NIMR, even though the last sixteen years were spent in the United States. In 1997 I spent a few months in Alan's lab at the NIH, a valuable experience when your ex-graduate student is your boss. This period gave me a unique insight into his tremendous productivity, capacity for hard work and leadership. For those who did not know him well his extraordinary pace of work and travels may have masked an endearing side of Alan's life as a caring family man who adored his two young children.

The cell science community has not only lost a leader but for many of us a dear friend. We know that Alan would not have achieved his success and reputation without the support and affection that he received from his wife Elizabeth, also a cell biologist then at the NIH and later at Sangamo. He is survived by her and their children Max and Katherine.

*Jam Tata*

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This article was originally published in the *Journal of Cell Science*.

Jam Tata has arranged for Gary Felsenfeld to give a lecture at the National Institute for Medical Research, Mill Hill on 20th March 2002 in honour of Alan. The session on Nuclear Structure and Function at the BSCB/BSDB/Genetical Society Joint Spring Meeting will also be dedicated to Alan.

# Cell biology in Denmark

*Uffe Birk Jensen*

*Denmark, a small country in Scandinavia, has a population of some 5.5 mllion people. It has a long tradition in science and is well known for its contribution in physics, medicine and chemistry; as an interdisciplinary field, cell biology benefits from this axis, as reflected by the award of the Nobel Prize to Dr Jens Skou for his work on the Na/K ATPase a few years ago.*

The cell biology in Denmark that is financed by the government is based mainly in four locations: The Universities of Copenhagen and Aarhus, The University of Southern Denmark and The Royal Veterinary and Agricultural University, KVL. However, major pharmaceutical companies such as NovoNordisk A/S (www.novonordisk.dk) and Lundbeck A/S (www.lundbeck.com) and biotech companies such as Neurosearch (www.neurosearch.dk/uk) also undertake cell biology. In order to enhance the interaction between industry and academic research, special programmes have been initiated making co-finance of post-docs possible and of mutual benefit to industry and government (Innovations post-doc program).

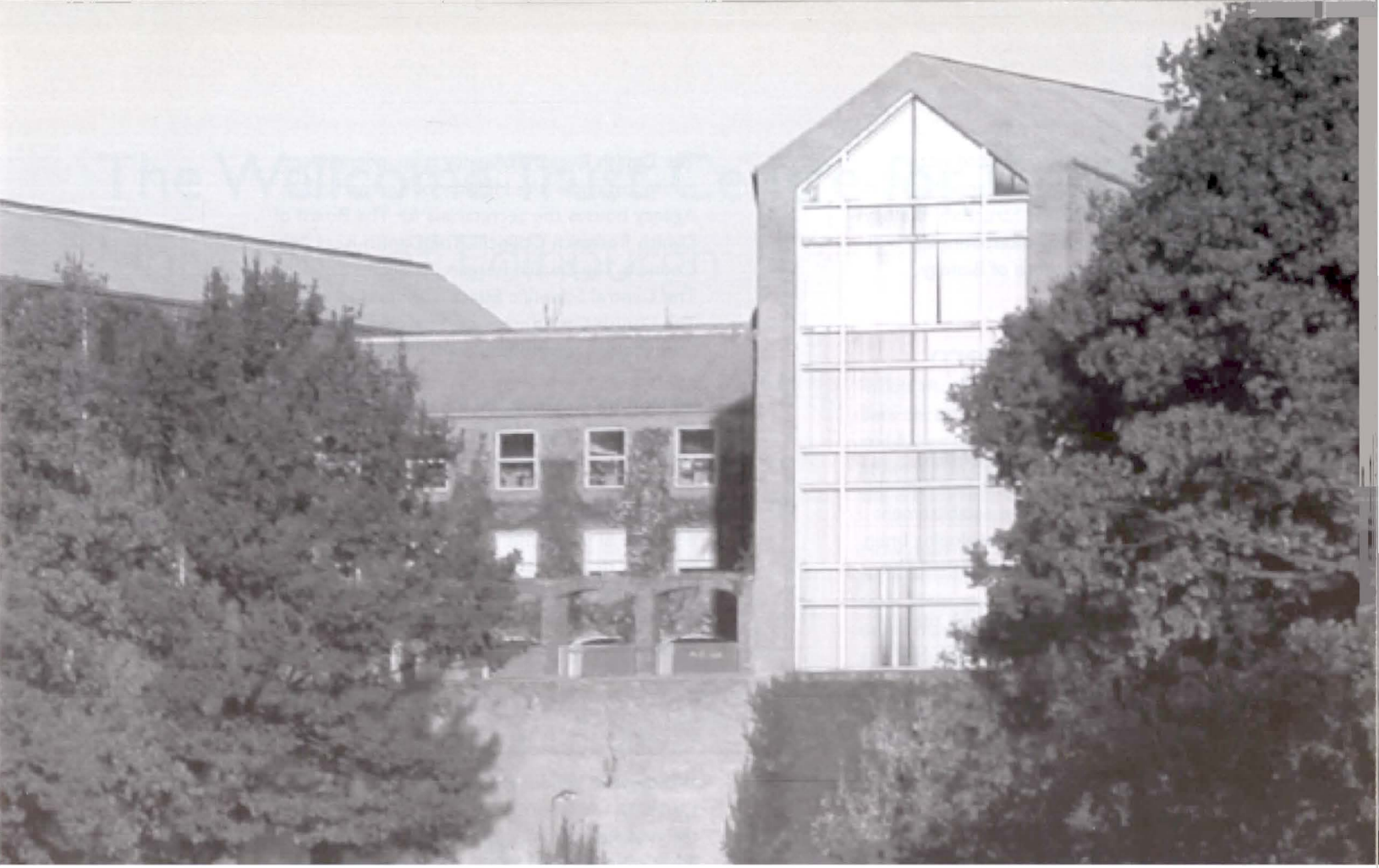
With the construction of the Øresund Bridge, linking Denmark and Sweden, came the foundation of the Øresund University (www.uni.oresund.org). It consists of a consortium of 12 universities and university colleges on both sides of the sound (Øresund) in the Swedish province of Skåne (Scania) and the Danish province of Zealand (Sjælland). The consortium is based on geographical proximity and a long common history and culture. More than 120 000 students inhabit this region and and the name Medicon Vally is used for the bio-medical part. Thus, Medicon Valley Academy (MVA, www.mva.org) is a membership based and financed, politically independent, network organisation.

## Danish Cancer Society (www.cancer.dk)

Cancer can be viewed as arising from a defect in cell cycle control and Dr Juri Bartek's group has been studying this aspect at a very high international level for a number of years. They have made important contributions to the understanding of the late G1 phase and G1/S transition as governed by the cyclin D/Cdk-p16-pRb-E2F pathway (currently referred to as the 'RB pathway'). They are now studying cell cycle transitions operating 'upstream' and 'downstream' of the late-G1 restriction point.

The work of Dr Marja Jättelä´s group is dedicated to the understanding of apoptotic processes in cancer cells. The aim is to identify the proteins inhibiting this pathway through studying the mechanisms by which they do so. Although many and varied stimuli can elicit apoptosis, the signalling pathways induced by them converge onto a common death pathway.

Other internationally well known groups are those of Dr Julio Celis (for identifying genes important in development of cancer of the bladder and for the establishment of The Danish Centre for Human Genome Research's 2-D PAGE Database at the University of Aarhus (http://biobase.dk/cgi-bin/celis)) and Dr. Keld Danø (for the involvement of the uPA-system in cancer development).



Above: The University of Aarhus

## University of Copenhagen (www.ku.dk)

This was established more than 500 years ago in 1479 and was the first university in Denmark. At the end of the 20th century, the university counted more than 35 000 students and a staff of some 7000. It is a leading university in Europe. The Panum Institute houses many departments engaged in cell biology and biomedicine. Dr Bo van Deurs´ lab at the Panum Institute has specialized in membrane domains and membrane traffic, currently focusing on the importance of caveolae and receptor localisation for signalling.

Methodologically, much attention is paid to quantitative multidimensional microscopy of live cells. The main theme of the research conducted in the lab of Dr Ole W. Petersen is tissue architecture of the human breast engineered in cell culture. Differences between normal and malignant phenotypes, as influenced by the microenvironment including extracellular matrix and interacting stromal cells, are studied.

## The University of Aarhus (www.au.dk)

The University of Aarhus is a relatively young institution founded in the 1920s, which adopted its current name in 1933. In 1999 there were more that 20 000 students and more than 700 PhD students: this figure should be matched against the local population of ca 250 000 citizens. The University has the advantage of being located on a campus with individual buildings housing the various departments.

Several groups have dedicated their work to receptors. In the Department of Medical Biochemistry, the group of Dr Claus M Petersen and Dr Jørgen Gliemann has focused on the Vps10p-domain receptor family, its interaction with adaptor proteins and its role in the sorting of cellular proteins. The group of Dr Søren K Moesgaard has studied receptors important in the metabolism of vitamins, lipoproteins and haemoglobin.

At the Institute of Anatomy, Dr Søren Nielsen has dedicated his work to the function of kidney

cells with emphasis on aquaporins and water handling. The Faculty of Natural Science harbours The Institute of Molecular and Structural Biology (www.mbio.au.dk) with many internationally well-known groups and The Institute of Biology (www.biology.au.dk).

## University of Southern Denmark

In the University of Odense Branch (www.ou.dk), in the city of Hans Christian Andersen, the research group of Dr Jens Simmer has long-standing expertise in the establishment and analysis of cultured slices of developing brain. A few years ago, the University established The Centre for Proteome Analysis (www.sdu.dk/Nat/CPA/index.html) with the aim of studying the composition and function of the proteome - information not available from the central dogma of molecular biology, DNA makes RNA makes protein. The Head of the centre is Dr Peter M Larsen.

## The Royal Veterinary and Agricultural University (KVL) (www.kvl.dk)

The research here is focused on basic cell biological and physiological questions regarding fertilisation and angiogenesis, cellular growth, differentiation and programmed cell death; membrane transport; heart and muscle function; and milk production.

## Funding

The prospects look dark from a financial point of view. Major cutbacks in governmental resources are expected in the years ahead. From 2001-2004, The Board of The Danish Research Councils has recommended a budget of around 200 000 € per year for its own activities in order to fulfil the agreement on Danish research reached by a broad majority of the parliament in May 2000. However, a gradual cutback to around 100 000 € p.a. is expected by 2004. This is a blinding contrast to the previous intentions and threatens the progress made over the past decade. The entire appropriation from the government dedicated to research and development is around 1.3 billion € (close to the OECD average of 2.16% of the GNP).

The Danish Research Agency is an independent institution under the Ministry of Research. The Agency houses the secretariats for The Board of Danish Research Councils, The Danish Research Councils, The Danish Research Training Council, The Central Scientific Ethical Committee, and The Danish Committees on Scientific Dishonesty and different programme committees.

Besides the governmental funding, a significant contribution comes from private foundations, forming approximately 20% of the total budget.

Socrates-Erasmus is the European Commission's educational programme for Higher Education students, teachers and institutions and can be used to increase the mobility of students within the EU (www.ukc.ac.uk/ERASMUS/erasmus/index.html).

## Living in Denmark

Yachting and wind surfing are excellent in Denmark with more that 7000 km of coastline to be exploited and a lot of wind. The cost of living is relatively high. When the Danes are asked about life in general, they emerge as the most contented and satisfied people in the entire EU. Although Denmark is a rich country with a highly developed welfare programme, one major form of transportation is the bicycle. You can go anywhere on a bicycle and most of the country has bicycle roads, making it quite safe even in cities with heavy traffic. The population in general has a high degree of education and what often strikes English-speaking visitors is that they can address almost any native in English and be able to hold a reasonable conversation.

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# The Wellcome Trust Centre for Cell Biology
## University of Edinburgh

*In September, I visited the new Wellcome Trust Centre for Cell Biology at the University of Edinburgh and met some of the group leaders and students. The overwhelming impression was of a relaxed, productive environment with everyone seemingly very happy to be working there.*

*Joan Marsh*

The Centre is housed in the Michael Swann building, which was first occupied in January 1996. Situated on the West Mains Road campus, there are stunning views of Edinburgh and Arthur's Seat from the canteen on the top floor. Funding came from the University, the Wellcome Trust, the Darwin Trust and the Wolfson Foundation, which has its own floor for the study of structural biology.

Yeast biologist Jean Beggs was part of the search and planning committee for the Centre and declares it to be 'very satisfactory'. With state-of-the-art facilities, it is easy to attract high quality staff. Wellcome Trust Centre status is an added bonus: the majority of the staff are Trust Fellows of some kind, ranging from first-time group leaders to more experienced staff in the equivalent of professorial positions. Jean feels that Trust status makes the Centre feel more of a unit, with members becoming more involved in strategic planning and future development. She also sees a major advantage in being attached to the university with the concomitant contact with students.

Below: the Michael Swann building, home to the Wellcome Trust Centre for Cell Biology. Picture courtesy of the Wellcome Trust MPL.

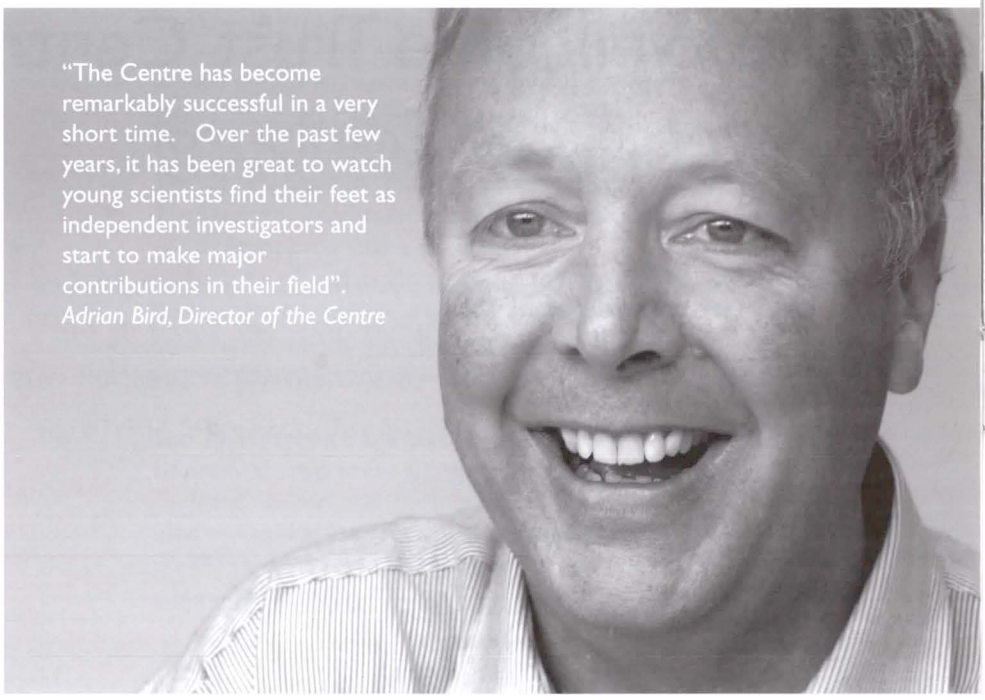
How does the Centre compare with similar institutes elsewhere? David Tollervey moved here from EMBL and says that while it is less international than the European centre, it compares well as a place to work. While others often express regret at leaving Heidelberg, he does not. Collaborations within the Centre are based largely on subject: David studies RNA processing and turnover, so he works with the other RNA groups but less with the cell cycle groups. One problem he has observed, which may be common to all institutes, is a shortage of British applicants for post-doc places.

So what is it like as a more junior researcher here? I spoke with three students who all emphasised the benefits of living in Edinburgh with easy access to the hills and to culture, with plenty of student accommodation near the Centre. Helmut Maiato is on a three-month visit from the University of Porto and is finding his time at the Centre very helpful. The central service facility houses microscopes and other large pieces of equipment, with technical staff available to give advice which is very useful for students. Sharon Vass and Helen Dobson liked the interaction that occurs between labs, with plenty of borrowing and lending. They also enjoyed the opportunity to attend the annual retreat in St Andrews and to participate in an annual exchange with the Cell Biology Centre in Dundee. Students are encouraged to go to the weekly seminars and have to present their own work to their Department during their final year. They felt that the Centre's reputation put an onus on students to produce good results, which can be advantageous but would not suit everyone.

"Please will you crystallise my favourite protein?" This is a request frequently heard by Paul

McLaughlin who works on the third floor which is devoted to crystallography. He focuses on interesting biological problems but enjoys the challenge in trying to crystallise large complexes. His current project is to determine the structure of the active form of gelsolin, an actin-severing protein that has six domains.

Another group leader who has been at the Centre from the beginning is Andrew Jarman. He studies neurogenesis in *Drosophila*, ranging from genetic analysis to the molecular biology of proteins. Diversity is a key feature of the Centre in his eyes: although his work differs from that of other groups, he is well placed to benefit from expertise in cell biology, for example in yeast two-hybrid screening. He enjoys the regular group meetings where the challenge is to persuade your peers that your work is interesting, which is good practice for writing grant applications. He benefits from the rigorous scientific criticism delivered in a positive way: "we compete scientifically, not politically".



"The Centre has become remarkably successful in a very short time. Over the past few years, it has been great to watch young scientists find their feet as independent investigators and start to make major contributions in their field".
*Adrian Bird, Director of the Centre*

Picture courtesy of the Wellcome Trust MPL.

# 'Alternative' Career Paths for Young Scientists

In June 2001, Margarete Heck, a Senior Research Fellow at the Wellcome Trust Centre for Cell Biology in Edinburgh who also acts as programme coordinator and student mentor for the four-year Wellcome PhD students, organised a careers seminar for the cohort. She invited several speakers who had all done a research-based PhD in academia, but were now in alternative science-related careers.

The invited speakers were Alex Eccleston (Editor, *Trends in Cell Biology*) and Peter Newmark (Biology Editorial Director, BioMedCentral), who both provided an intriguing insight into the world of scientific publishing. Alun Owen (Scientific Programme Officer, The Wellcome Trust) enthused about working for the Trust in an advisory capacity. Ken Milne (Principle Scientist, Axis-Shield) represented the industrial side of scientific research and Alastair Philp (Centre for Exploitation of Science and Technology) gave an enlightening account of scientific policy. Margarete Heck also contributed from the perspective of an academic research scientist.

The session began with each speaker giving a short presentation on where their scientific careers began, what they were doing now and how they got there. Interestingly, without exception, all had taken at least one research-based post-doctoral position and all seemed to be of the opinion that this was a pivotal point in their career paths. During the coffee break, the students were given the opportunity to chat with the speakers in a less formal setting. I was lucky enough to talk to Alex Eccleston and was somewhat in awe of a woman not much older than myself who had reached a senior editorial position.

The second half of the forum was devoted to open discussion, where students were invited to ask the guest speakers specific or general questions about their subject areas and career paths. The session was fast moving and very informative, with many of the key issues facing young scientists being covered, such as career prospects, job security, working abroad and remuneration.

The take-home message from all the speakers was definitely to finish your PhD, undertake at least one post-doc, and get as much experience and expertise as possible, then decide what you enjoy doing and where your interests lie. The session was very useful, informative and thought provoking. For me, at least, the golden nugget of careers advice for the day was contributed by Alastair Philp who said, "Imagine your ideal job, write it down, then make someone give it to you"!

Nice work if you can get it.

*Sharron Vass, PhD Student.*

# Science in Society

## PLUS meeting, University of Glasgow, September 17th 2001

POSTGRADUATE LIFESCIENCE UNIVERSITIES *in* SCOTLAND

*This meeting was the first organised by the PLUS group (http://www.plus.ac.uk), which was formed by the Graduate Schools, or their equivalent, in biological and medical sciences of the seven research-led universities in Scotland. Over 260 graduate students from these institutions formed the audience for a day focused on some of the ethical and practical issues covered by the title – one coincidentally shared with the British Association meeting held in Glasgow earlier in September. The organisers were delighted to be able to acknowledge at the meeting the generous sponsorship we received from The British Society for Cell Biology, as well as The Biochemical Society, The Company of Biologists, The Society for General Microbiology, The Institute of Biology and The Immunological Society.*

*Neil Gow, Steve Hillier and David Miller*

The morning session had four eminent speakers representing the interface between science and politics (Professor Willie Russell), bioethics (Sir Kenneth Calman), stem cell research (Dr Austin Smith) and genetically modified (GM) foods (Professor Tony Trewavas).

Professor Russell described the structure of the government's scientific advisory boards and pointed out that the UK had a strong research base, managed by a government that historically was not strongly representative of professional scientists. Hence the need for students to become actively involved in the debate about scientific issues is vital.

Sir Kenneth Calman discussed the fact that ethical issues are now centre stage in the working lives of all professional life-scientists yet, unlike in many professions, there is no formally agreed code of practice for scientists. This is important since the general public are distrustful of the mechanisms to police scientific research and are generally unaware of the checks and balances which ensure that public sector scientific research is ethically sound. He challenged the audience to develop a report with suggestions for such a code of practice for scientists.

Dr Austin Smith gave an excellent overview of stem cell research in general and the arguments supporting the need for embryonic stem cell research in medicine. He also outlined the regulatory procedures and mechanisms for monitoring stem cell research in the UK, which is one of the most carefully controlled programmes in the world.

Finally, Professor Trewavas summarised the strong arguments in favour of the measured and careful development of GM food technologies, in particular its considerable impact on the health

of individuals in developing countries with burgeoning requirements for food to support expanding populations. All talks were debated and challenged by insightful questions from the student audience.

The afternoon session dealt with the thorny issues of the commercialisation of science, use of animals in research, and 'science and religion: are they compatible?' Professor John Coggins (Glasgow) set out the UK government's current stance on the commercialisation of science, illustrating how so many of the scenarios envisaged in the 1993 'Realising our Potential' White Paper were now being realised and, for better or worse, having their impact.

Acknowledging the overall need for state-funded research to deliver commercial benefits to the nation, it was argued that the intellectual imperative to discover new knowledge remained the driver for most post-doctoral scientists newly embarking on their research careers. The telling point was made that it need not matter to the progress of a researcher's career if their work was published in patents or as peer-reviewed scientific articles, so long as the research was of the highest quality and that it was published!

Turning to the use of animals in research, Dr. Mark Matfield from the Research Defence Society analysed the respective roles of politicians, the media and the scientific community itself in moulding society's views on this most contentious of issues. UK law covering the use of experimental animal models for research is probably the strictest in the world. Through the Home Office licensing system, with mandatory approval of local ethics committees, every attempt is made to ensure that each procedure using animals is not only humane but also fully justified by the potential benefit it has to human well-being.

The principle of the 3Rs – Replacement (use of alternatives to animals), Reduction (absolute minimisation of animal usage) and Refinement (use of the most humane and acceptable procedures) – rules the day. The issue rightly remains controversial and the scientific community must continue to work in this caring and sensitive way, seeking to inform the ongoing political and public debate.

Finally, Gordon Graham, Professor of Moral Philosophy at the University of Aberdeen, dealt with the big question concerning the compatibility of science and religion. His discourse challenged the audience to consider that post-Darwinian science seems to explain most of the material world we inhabit – but not everything... The participants in the enthusiastic and entertaining discussion that followed agreed to disagree on most of the issues raised, which seemed a satisfactory conclusion to the session.

A buffet lunch between the sessions allowed students and speakers to enjoy some early autumn sunshine as they made the short walk from the lecture hall in the Boyd Orr Building to the neo-Gothic splendour of the Bute Hall. This, and the coffee breaks, reinforced the value of bringing graduate students together from several departments and universities – lively discussion stimulated by the sessions was evident as people took the chance to make new friends.

Participants were given a questionnaire which was returned by nearly 80 respondents. We found the only significant criticisms were 'too little time for discussion' – a sure sign of the liveliness of the debate generated by our speakers – and a frequent call for 'small group' consideration of the topics raised. The lecture theatre was too cold for some in the morning (perhaps our misplaced deference to the Aberdeen contingent!). The speakers were universally praised for the quality and variety of their presentations, the secret of any successful meeting.

The steering group of PLUS was heartened by the evident success of this first venture, which contributed to a vital generic aspect of postgraduate research training. The meeting, especially its subject matter, was enthusiastically greeted by the (predominantly) young participants. This should encourage us all that the ethical challenges so prominent in biological and medical research are being keenly considered by the next generation of scientists.

*Neil Gow (Aberdeen), Steve Hillier (Edinburgh), David Miller (Glasgow) for PLUS*
*September 2001*

# Cell Cycle Trials in Salamanca (or Spanish Inquisitiveness)

*The time trial stage of the annual 'La vuelta' cycle race was held in Salamanca in early September 2001. By coincidence, the cell cycle went on trial in Salamanca at the same time, at an EMBO workshop on 'G2/M progression and associated checkpoints' organised by Angel Nebreda, Tim Hunt, Sergio Moreno and Paul Nurse. This was a highly enjoyable and stimulating meeting that covered a wide range of topics concerning the less fashionable part of the cell cycle; p53 was hardly mentioned and Rb got very short shrift! In this report, I will highlight some of the novel trends and concepts that emerged during the meeting rather than review all the presentations. My apologies to those speakers whose talks I have been unable to include.*

## The polo-like kinases: wresting mitosis from the cyclin-CDKs

*Jonathon Pines*

The plenary lecture was given by Stephen Elledge (Baylor College, Texas), who introduced some of the themes that would recur during the meeting. He showed that in budding yeast, the Bfa1/Byr4 protein – which forms a two-component GAP (GTPase-activating protein) with Bub2 – is controlled by phosphorylation. The Bfa1-Bub2 pathway regulates exit from mitosis in response to the structure and position of the mitotic spindle, and in response to DNA damage. Stephen presented evidence that Cdc5, one of the polo family of protein kinases, phosphorylates Bfa1 in anaphase to facilitate exit from mitosis. This phosphorylation was blocked by the spindle assembly and orientation checkpoints. In addition, DNA damage could block mitosis by two pathways: phosphorylation of the anaphase inhibitor securin to prevent its destruction, and hyperphosphorylation of Bfa1 that may help to prevent mitotic exit. During the meeting it became apparent that the polo family of kinases had eclipsed the cyclin-CDK family as the most multi-faceted mitotic kinases.

An effect of DNA damage in mitosis on the polo family was also demonstrated in animal cells. René Medema (NKI, The Netherlands) showed that treating mitotic cells with agents that cause double strand breaks arrested cells in mitosis and inhibited the Polo-like kinase (Plk1) via a pathway that required the ATM kinase. Conly Rieder (Wadsworth Center, NY) confirmed this effect – in his own, inimitable style – by irradiating different cell lines in mitosis with high power laser pulses and showing that this caused them to delay in metaphase for several hours independently of the MAD-dependent spindle checkpoint (see below). These cells stained positive for phosphorylated histone H2AX, demonstrating that the DNA damage response pathway had been activated, and the delay could be abrogated with 2 mM caffeine, which inhibits the ATM kinase. Interestingly, when cells finally exited mitosis (in the absence of caffeine), they still stained for phosphorylated H2AX, indicating that the damage may not have been repaired.

The importance of the polo kinases in initiating mitosis was highlighted by a number of speakers. Jan Michael Peters (IMP, Vienna, Austria) showed that, in vertebrate cells, Plk1 was required for

removing the bulk of the cohesin complexes from chromosome arms in prophase. This set the stage for the final separation of sister chromatids when the separase protease cleaved the last remaining cohesin subunits holding together the centromeres at the end of metaphase. Iain Hagan (Manchester University, UK) showed that a mutation in a spindle pole component, called stf1 or cut12, caused the fission yeast polo kinase, plo1, to be recruited prematurely to the spindle. This by-passed the requirement for the Cdc25 phosphatase that is normally required to activate the cyclin B/CDK kinase to initiate mitosis. Furthermore, he neatly demonstrated, using a temperature-sensitive mutant, that the fin1 kinase was required for plo1 to go to the spindle pole.

Fumiko Toyoshima (Kyoto University, Japan) showed that human Plk1 phosphorylated both cyclin B1 and its activator Cdc25C, causing them to accumulate in the nucleus at mitosis by reducing their nuclear export. The physiological relevance of this to mitosis remained unclear but Marcel Dorée (CNRS, Montpellier, France) intriguingly showed that a non-phosphorylatable mutant of cyclin B1 could not be activated in the presence or absence of a nucleus. He presented data that indicated that cyclin B1 might need to be phosphorylated for the cyclin B/CDK1 kinase to interact correctly with Cdc25.

That the polo kinases were not exclusively concerned with regulating cyclin-CDK complexes at the beginning of mitosis was demonstrated by Erich Nigg (MPI, Martinsreid, Germany), who showed that Plk1 interacted with a centrosome component, Nlp (ninein-like protein). When overexpressed in tissue culture cells, Nlp recruited the γ-tubulin ring complex to the centrosome and Plk1 appeared to cause Nlp1 to release the complex, leading Erich to propose that this represented a step in centrosome maturation.

## Dawn of the aurora era?

In addition to the prominent role played by the polo family of kinases, the meeting saw the aurora family of kinases begin to shine. Jason Swedlow (Dundee University, Scotland) showed that aurora B was the major histone H3 kinase in mitotic cells and was regulated by interaction with the PP1 phosphatase. Histone H3 phosphorylation had been proposed directly to cause chromosome condensation, but Jason Swedlow argued against this interpretation, favouring a role in making DNA more flexible, possibly to allow condensin complexes to act more efficiently.

Kim Nasmyth (IMP, Vienna, Austria) illustrated another role for aurora (Ipl1) in budding yeast. In a classic demonstration of solving problems through logic, he demonstrated that Ipl1 was required for chromosomes to attach properly to both poles of the spindle. He showed that Ipl1 formed part of an error correction mechanism; when both sets of sister chromatids improperly attached to only one pole, Ipl1 was needed to detach microtubules from the kinetochores of one set of chromatids to allow these kinetochores to capture microtubules from the other pole. When chromosomes were properly attached to both poles, Ipl1 no longer localised to the kinetochores. A number of published papers had implicated the aurora kinases in the proper control of cytokinesis and Tano Gonzalez (EMBL, Heidelberg, Germany) showed that aurora B required the Cdc37 and Hsp90 chaperones in order to fulfil this role in *Drosophila* meiosis.

## Spindle checkpoints and chaperones

Chaperone proteins made a second, unexpected appearance in a presentation given by Wolfgang Zachariae (MPI, Dresden, Germany). He showed that the CCT chaperonin complex, previously known for its role in actin and tubulin folding, played an important role in activating the Anaphase Promoting Complex/Cyclosome (APC/C). The APC/C acted as a multi-subunit ubiquitin ligase to control the degradation of a number of key mitotic regulators. To perform this role, the APC/C bound members of the WD40 family of proteins – in budding yeast these were identified as Cdc20p and Cdh1/Hct1p. Wolfgang Zachariae found that the bulk of Cdc20 in a yeast cell was bound to the CCT chaperonin complex rather than to the APC/C. Furthermore, mutations in the CCT prevented Cdc20 (and Cdh1) from binding to the APC/C and arrested cells in mitosis.

Cdc20 had first come to prominence as the target of the spindle assembly checkpoint. This checkpoint, mediated by the three *MAD* and three *BUB*

Above: Rio Tormes and the cathedral, Salamanca. Courtesy of Alain W.

genes plus the Mps1 kinase, had been shown to be essential for the proper segregation of chromosomes, and thus for genomic stability. When activated, the spindle checkpoint was known to block APC/C-mediated proteolysis and substantial data indicated Cdc20 to be the target of the checkpoint. The prevailing view had been that the end-point of the checkpoint was the activation of MAD2 by unattached kinetochores. Active MAD2 then bound and inactivated Cdc20p.

However, two speakers challenged this view. Kevin Hardwick (ICMB, Edinburgh, Scotland) found that there are two important complexes involved: one with Mad3, Bub3, Mad2 and Cdc20 and a second with Mad1, Bub1 and Bub3. Bub1 and Bub3 appeared to be the most important proteins for genomic stability, perhaps because they have roles in addition to the spindle checkpoint. Simoetta Piatti (Milan University, Italy) also found that the complex that bound Cdc20 consisted of several spindle checkpoint components, but, in contrast to Kevin Hardwick, she found that Mad1 and Bub1 were included in the complex with Bub3, Mad2, Mad3 and Cdc20. She also stressed the importance of Bub3, itself a WD40 protein, to the checkpoint and to genomic stability. Katja Wassmann (University of Paris, France) revealed that the interaction between MAD2 and the APC could also be regulated by phosphorylation on MAD2.

## There is more to separase than just securin

As mentioned above, a separate branch of the spindle checkpoint pathway in budding yeast had been shown to respond to the position of the spindle and was regulated through Byr4/Bub2. This pathway regulated exit from mitosis, in particular the activation of the Cdc14 phosphatase. Angelika Amon (Whitehead Institute, USA) presented evidence indicating some cross-talk between the two branches of the pathway. One of the primary effects of having satisfied the kinetochore branch of the spindle checkpoint and activating Cdc20 was the destruction of securin (Pds1). This activated separase (Esp1) to cleave the cohesins holding sister chromatids together. However, Angelika Amon found another role for separase; it was required to activate a small amount of Cdc14 by liberating Cdc14 from its partner Cfi1 in the nucleolus. This appeared to be required to initiate a timely exit from mitosis, because in the absence of separase cells were delayed in mitosis for up to 40 min. Frank Uhlmann (ICRF, UK) had also found a role for separase in late mitosis. He showed that in addition to securin, separase cleaved the Slk19 protein and this was required to generate a stable spindle in anaphase. The physiological significance of this was confirmed by mutating the cleavage site in Slk19; the resultant, non-cleavable Slk19 partially destabilised spindles and at higher levels caused an increase in the rate of chromosome loss.

## The MAP kinase pathway in meiosis: who needs it?

In mouse meiosis, the task of stabilising the spindle appeared to fall to a substrate of the MAP kinase pathway. Marie-Helene Verlhac (University of Paris, France) identified the MISS (MAP kinase interacting and spindle stabilising) protein as a potential MAPK kinase substrate in a yeast two-hybrid screen and showed that in its absence the spindle failed to remain stable during metaphase II arrest; instead the oocyte contained numerous microtubule asters. The role of the MAP kinase pathway in meiotic maturation provided the topic for one of several lively debates in the meeting. The published literature had shown a requirement for the Mos-MAPKK-MAPK path-

way in meiotic maturation, notably in the frog oocyte. However, the general consensus from the talks at the meeting pointed more robustly toward a role in blocking cells in metaphase of meiosis II. Catherine Jessus (University of Paris, France) showed that inhibiting the MAPK kinase pathway with the MAPKK inhibitor, U0126, or with anti-sense morpholino-oligonucleotides directed against *mos*, delayed but did not block frog oocyte maturation. The terminal phenotype was an inability to maintain arrest in meiosis II so oocytes tended to undergo parthenogenetic activation. This resembled the phenotype of both *mos*$^{-/-}$ knock-out mice and *mos*-ablated starfish oocytes.

Angel Nebreda (EMBL, Heidelberg, Germany) introduced the RINGO proteins. These proteins were newly synthesised during meiotic maturation and were able to activate cyclin-dependent kinases 1 and 2 in a manner that by-passed all previously known regulatory pathways. RINGO-CDK complexes did not need to be phosphorylated to be activated, nor did they require the services of Cdc25. Moreover, exogenous RINGO was able to initiate meiosis independently of MAP kinase and in the absence of protein synthesis. Takeo Kishimoto (Tokyo Institute of Technology, Japan) clearly showed that the PKB/Akt protein kinase, and not MAP kinase or (remarkably!) the polo kinase, was instrumental in reinitiating meiosis in starfish oocytes. PKB/Akt did this by phosphorylating and inactivating the Myt1 kinase that kept cyclin B/CDK1 in check.

Interestingly, PKB/Akt phosphorylated the same consensus site as the Rsk protein kinase that is downstream of MAP kinase. James Maller (University of Colorado, USA) showed that Rsk could be the effector of meiosis II arrest because it was active in frog meiosis II and exogenous Rsk was able to arrest cleaving frog blastomeres in mitosis in the absence of MAP kinase activity. Furthermore, he presented data that might connect arrest in metaphase of meiosis II with the spindle checkpoint. He found that Rsk could phosphorylate and activate the Bub I kinase *in vitro*, and that Bub1 was phosphorylated in a MAPKK-dependent manner during meiotic maturation. Until this meeting, there had been little evidence to link arrest in mitotic metaphase by the spindle checkpoint with the arrest of oocytes in metaphase of meiosis II. Helfried Hochegger (ICRF, UK) contributed two further players to meiosis II arrest in frogs, cyclins B1 and B4. These were meiosis-specific B-type cyclins that were newly synthesised during maturation and required for the oocyte to progress from meiosis I to meiosis II. In their absence (generated using anti-sense oligonucleotides), after meiosis I the meiotic spindle disassembled, MAP kinase was inactivated and the APC/C was partially dephosphorylated.

## G2 checkpoints: breast cancer in yeast and frogs

Lastly, no meeting on G2 to M could be complete without a discussion of G2 checkpoints. Both damaged DNA and unreplicated DNA had been shown to prevent cells from entering mitosis via a signal transduction cascades that involved the ATM or the ATR kinase. The effector molecules that acted on the cell cycle machinery had been identified as the Chk1 and Chk2/Cds1 kinases. Aside from the data implicating the polo kinases as targets of these checkpoints, the underlying theme that emerged from the checkpoint talks at this meeting was that both Chk1 and Chk2 needed a co-factor to block the cell cycle, and these co-factors had BRCT domains, first identified in the breast-cancer-related genes, *BRCA1* and *BRCA2*.

Paul Russell (RISC, La Jolla, USA) described the Mrc1 protein (Mediator of Replication Checkpoint). He identified this protein in fission yeast as a component required for Cds1 to arrest the cell cycle in response to DNA damage. He showed that Mrc1 was only expressed during the S and early G2 stages of the cell cycle, and that exogenous expression in late G2 phase allowed Cds1 to arrest the cell cycle.

Tony Carr (University of Sussex, UK) presented data on the fission yeast *BRCA1* homologue, *Crb2*, that linked recombination with the cell cycle machinery. He showed that cells with mutant alleles of a B-type cyclin (*cdc13*) or *Crb2* were radiation sensitive because they entered mitosis with damaged DNA, although the delay to mitosis was equivalent to wild type. Crb2 was itself phosphorylated by cyclin B/cdc2 in G2 phase and alleles of cells with mutant forms of Crb2 that could not be phosphorylated by cyclin B/cdc2 were radiation sensitive. Radiation sensitivity depended on the fission yeast RecQ helicase

Above: Plaza Mayor, Salamanca. Courtesy of Alain W.

homologue, Rqh1, indicating that cyclin B/cdc2 controls the recombination machinery in G2 phase via Crb2.

Ashok Venkitaraman (University of Cambridge, UK) presented evidence on mammalian BRCA2 that may be related to this. He showed that in the absence of BRCA2, mammalian cells spontaneously accumulated double strand breaks without exposure to genotoxins. He speculated that these breaks could have been caused during replication. Bill Dunphy (CalTech, Pasadena, USA) had isolated claspin as a protein required for Chk1 to block the cell cycle in response to double-stranded DNA oligos in *Xenopus* extracts. This response depended on the ATR kinase that phosphorylated SQ motifs, and mutating four SQ motifs in Chk1 prevented its phosphorylation and activation by ATR. Similarly, Chk1 could not be phosphorylated and activated when claspin was immunodepleted, and claspin bound more strongly to the mutated form of Chk1. Thus, it appeared that claspin-binding was required for the subsequent phosphorylation and activation of Chk1.

Lastly, Mitsuhiro Yanagida (Kyoto University, Japan) revealed an unexpected link between chromosome condensation and DNA damage repair. He first presented the structure of the condensin complex revealed by atomic force microscopy as having two globular heads linked by a hinge region. The hinge region appeared to be the part that interacted with DNA. After this, he showed that a mutation in one of the condensin subunits, Cnd2, not only prevented DNA condensation, but also caused a defect in DNA repair and prevented the activation of the unreplicated DNA checkpoint. Although these cells were delayed in entering mitosis, once they did try to divide, the damaged DNA meant that they were unable properly to segregate their chromosomes.

In all respects this was an excellent meeting. The talks were of a uniformly high standard, the atmosphere was relaxed and friendly, the discussions were lively and intelligent, and the city of Salamanca never seems to sleep, so the more insomniac delegates could continue those debates in its beautiful plazas until the morning. Excellent, but exhausting.

*Jonathon Pines*
*Wellcome/CRC Institute of Cancer and Developmental Biology*
*Cambridge*

# Book reviews

## Endocrine Cell Culture: Handbooks in Practical Animal Cell Biology

*Edited by Stephen Bidey*

If you are thinking of moving into a new area of *in vitro* endocrine cell biology, then this is the ideal manual to get you started. At first glance it's a slim volume, but it contains all the necessary detail to establish primary cultures from a wide range of endocrine tissues. Each chapter offers a comprehensive list of materials and reagents, a clear step-by-step protocol that covers every manoeuvre from start to finish, and a trouble-shooting guide for what to do when things go wrong, as they often do with culture work.

A very welcome feature is the unusually high number of illustrations for a book of this type. These consist of a selection of simple but handy anatomical diagrams (e.g. where to find your bovine adrenal glands after the steer has been sawn in half) and a good number of photographs to illustrate both the dissected tissue and, most importantly, what your cells should look like if you've succeeded in establishing the correct culture.

Anyone who works on a reduced budget will appreciate the money-saving tips, such as when and how cell culture materials can be recycled. I also liked the personal touch of some authors, who balanced 'we use this protease because...' with 'some colleagues say they get good results with...'.

Best of all, this book succeeds, in only a few pages, in pre-empting many of your questions by going beyond a 'how to' approach and giving you a surprising amount of 'why this bit is important'.

Crystal clear cell culture advice. You'll want to wrap it in plastic and keep it on the lab bench.

*Gareth Cuttle, Departamento de Ciências Fisiológicas, Centro de Ciências Biológicas, Universidade Federal de Santa Catarina, Florianópolis, Brazil*

## Successful Scientific Writing

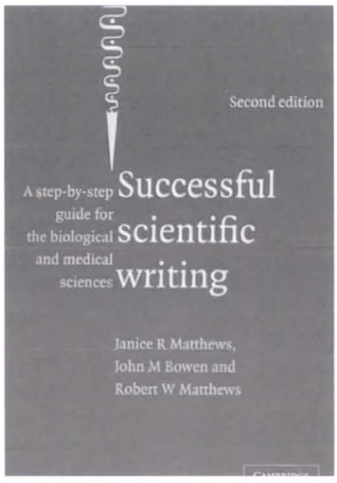
*JR Matthews, JM Bowen and RW Matthews*

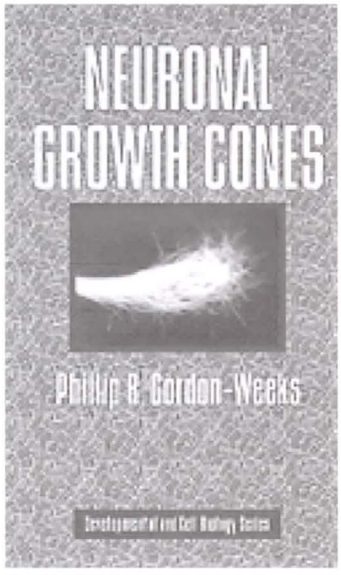
This was one of the most enjoyable and informative books that I have read in recent years. Primarily, it is aimed at those writers who are hoping to have their scientific work published for the first time. However, it is also a must for all undergraduate and postgraduate science students.

The authors have the ability to convey, in a user-friendly way, all the stages that are needed in order to write any scientific work, from an essay or dissertation through to a full journal article. The book is well organised, allowing the reader to pick and choose sections that are most suited to their individual needs. There are chapters on literature searching as well as those describing useful techniques for organising and planning the content of your written work. Other chapters give advice on every stage of writing from the first draft to the final version, including when and where to use tables and figures and, importantly, chapters on everybody's favourite grammar and punctuation.

I know that I will refer to this book frequently throughout my time as a PhD student and onwards into my scientific career.

*Elaine Hemers, Department of Physiology, University of Liverpool*




**Endocrine cell culture**
£52.50
Hardback, 166 pages. Cambridge University Press; ISBN: 0521593999

**Successful Scientific Writing**
£15.95.
Paperback, 252 pages, 2nd Ed. Cambridge University Press; ISBN: 0521789621.

**Neural Growth Cones: The Molecular Approach to Their Behaviour**
£55
Hardback, 271 pages. Cambridge University Press; ISBN: 0521444918

# Neuronal Growth Cones

*Phillip R. Gordon-Weeks*

We are able to write this review and you are able to read it because the 15 billion or so neurons in each of our brains have connected to each other in a stereotypical pattern of staggering complexity. Each individual connection has been made during our development by the movement of cellular elements called growth cones from one cell to another. The navigational feats achieved by growth cones are often spectacular, requiring them to make numerous accurate turns over distances that are enormous when compared to their own size.

Ramon y Cajal discovered and named growth cones in the late 19th century, using the analogy of a 'living battering ram, soft and flexible' to describe them. Phillip Gordon-Weeks uses other analogies, 'a spider spinning a web or the laying of a telephone cable by a cable-laying ship', and describes the appearance of a growth cone as an enlargement at the end of a growing neurite with 'fine, finger-like extensions'. These newer analogies are satisfying, given that we now know that growth cones possess remarkable autonomy from their cell bodies, retaining the ability to move and navigate even when their connection to the rest of the cell is severed.

This book provides a detailed treatment of our current knowledge of the neuronal growth cone and is intended for graduate students and more experienced researchers. It comprises a general introduction, a description of the growth cone cytoskeleton, axon pathfinding, intracellular signalling in growth cones, and a brief chapter on synaptogenesis. The book is primarily a compendium of 100 years of experiments investigating growth cone function, from their discovery, through analysis of their mechanical properties to the identification and characterisation of some of the molecules involved. The text is enthusiastically written and extensively referenced.

The field of growth cone navigation is expanding very rapidly and a book such as this, which draws together and summarises the current state of knowledge, is certain to be of value to those researching this topic. As Phillip Gordon-Weeks admits in the preface, the exponential increase in publications on the growth cone as he wrote the book subjected him to a 'Herculean task', and inevitably the downside of this being such an active topic of research is that aspects of the book will become dated quite rapidly. For example, the GTPases (Rho, Rac and Cdc42) that regulate changes in the cytoskeleton in response to growth cone guidance cues are only given one page, the semaphorins are referred to by their old names rather than the nomenclature adopted in 1999, and the Robo/Slit axon guidance system is described very briefly. Yet the success of the book in consolidating such a large body of literature, describing current understanding that is unlikely to alter much, far outweighs problems of omitting the latest findings. In fact, his approach gives the narrative a more rounded feel and does not confuse the reader with a mass of up-to-the-minute data that has yet to fit into a clear picture. We are sure that many of those in or entering the field will consult the book for many years to come.

One aspect of the book is disappointing: the figures. Even for the experienced reader, more figures would make for a more relaxing read. Where figures are present, they are often of primary data. Certainly, there are some striking pictures of growth cones that illustrate points made in the text, but we yearned for more summary diagrams to emphasise and summarise key points and to interrupt and provide a focal point for the often long tracts of text. Where diagrams are used, they are sometimes drawn with poor quality. Unfortunately, those who consult the book to find clear illustrations of sufficient quality for teaching will be largely unsuccessful.

In summary, this book provides a rich source of information on the experimental attack on the neuronal growth cone. It contains a comprehensive record of how people have thought about growth cones over the past 100 years, the experiments they have done to look at their behaviour, and a sprinkling of experimental anecdotes and original data. Each chapter, and sections within chapters, can be read in isolation making it a useful reference text. We would recommend it to anyone who, like us, is working on axonal growth and guidance and wishes to consult a single reference to deepen their understanding of what goes on in these tiny structures, whose 'sources of marvellous power by which nerve expansions make direct contact with far-off ... cells' first fascinated Ramon y Cajal 100 years ago.

*Tom Pratt and David J. Price, University of Edinburgh*

# Fancy a good read?

We have several books available for review, just waiting for some budding literary critics to shed their reticence and step forward. Reviews may be short and sweet, long and effusive or blunt and to the point; all will be published in this newsletter, that of the BSDB or both. The reward? Your name in print and the book on your office shelf or bedside table.

Anyone interested in reviewing any of the following should contact Andy Furley (A.J.Furley@Sheffield.ac.uk).

The Coiled Spring: How life begins
*Ethan Bier, Cold Spring Harbor Press*

Molecular Embryology: Methods & Protocols. *Paul Sharpe & Ivor Mason, Humana Press*

Pollen Biotechnology for Crop Production & Improvement
*Shivana & Sawhney, Cambridge University Press*

Molecular Methods in Developmental Biology
*Ed. Matthew Guille, Humana Press*

*Dictyostelium*: Evolution, Cell Biology & the Development of Multicellularity
*Richard Kessin, Cambridge University Press*

Translational Control of Gene Expression. *Sonenberg, Hershey and Mathews, Cold Spring Harbor Press*

Genomic Imprinting: Methods and Protocols. *Ward, Humana Press*

For these, contact Joan Marsh (jmarsh@wiley.co.uk)

Essential Developmental Biology,
*Jonathan Slack, Blackwell Science*

Principles of cell proliferation
*John Heath, Blackwell Science*

Gene Transcription: mechanisms and control
*Robert White, Blackwell Science*

Liaisons of life
*Tom Wakeford, John Wiley & Sons*

# Joint Spring Meeting
# University of York, 20–23 March 2002

## BSCB Cell Regulation through Molecular Machines
## BSDB/Genetics Society Evolution of Developmental Mechanisms

## Speaker Programme

## Thursday, March 21

### BSCB 1

**Nuclear structure and function**
*In honour of Alan Wolffe*
Chair: Angus Lamond (Dundee)
Invited speakers:
- Wendy Bickmore (Edinburgh)
- David Tollervy (Edinburgh)
- Roel van Driel (Amsterdam)
- Greg Matera (Cleveland)

*10am–12.30pm Coffee 11-11.30am*

*Lunch and Posters 12.30–2pm*

**Nuclear pores and transport**
Chair: Sara Nakielny (London)
Invited speakers:
- Paul Clarke (Dundee)
- Dirk Gorlich (Heidelberg)
- Iain Mattaj (Heidelberg)
- Gideon Dreyfuss (Philadelphia)

*3–5.30pm Tea 4–4.30pm*

*Coaches to York Railway Museum 7-7.30pm*
*Drinks reception and banquet 7.30-11pm*

### BSCB 2

**Plenary Talk**
Hugh Pelham (Cambridge)
*9-9.50am Central Hall*

**Cytoskeletal and cytoplasmic transport**
Chair: Michael Way (London)
Invited speakers:
- Folma Buss (Cambridge)
- Thierry Soldati (London)
- Larry Goldstein (La Jolla) ***Borden lecturer***
- Urs Greber (Zurich)

*10am–12.35pm Coffee 11-11.30am*

*Lunch and Posters 12.30–2pm*

**Balfour lecture**
Adam Eyre-Walker (Sussex)
*2–2.45pm Central Hall*

**Lipid rafts**
Chair: Tony Magee (London)
Invited speakers:
- Roger Morris (London)
- Kai Simons (Dresden)
- Michael Lisanti (New York)
- Debbie Brown (Stony Brook)

*3-5.30pm Tea 4–4.30pm*

*Coaches to York Railway Museum 7-7.30pm*
*Drinks reception and banquet 7:30-11pm*

### BSDB/GenSoc

**Genomes, evolution and development**
Chair: Peter Holland
- Jonathan Hodgkin (Oxford)
- Noriyuki Satoh (Kyoto)
- Paul Nurse (London)
- Virginia Walbot (Stanford)
- John Postlethwait (Eugene)

*10am–12.35pm Coffee 10.50–11.20am*

*Lunch and Posters 12.35–2pm*

**Evolution and gene regulation**
Chair: Paul Nurse
- Denis Duboule (Geneva)
- Mike Levine (Berkeley)

*3–3.50pm Tea 3.50–4.30pm*

Parallel a: **Promega Young Life Scientist**
*(10 speakers x 10min, plus judging)*
*4.30-6.30pm*

Parallel b: **Workshop on Molecular phylogeny**
- Sandra Baldauf (York)
- Peter Holland (Reading)

*4.30–6.30pm*

*Coaches to York Railway Museum 7–7.30pm*
*Drinks reception, banquet, and announcement of Promega Winner 7.30–11pm*

*All registration forms and further information at www.bscb.org*

# Friday, March 22

## BSCB 1

**Proteasomes**
Chair: Jenny Rivett (Bristol)
Invited speakers:
- Ron Hay (St Andrews)
- Martin Allday (London)
- Wolfgang Baumeister (Munich)
- Ron Kopito (Stanford)

*9–11.00am Coffee 11–11.30am*

**BSCB Hooke Medal Lecture**
*11.30am-12.30pm*

*Lunch and Posters 12.30-2pm*

**Cell cycle**
Chair: Kevin Hardwick (Edinburgh)
Invited speakers:
- John Kilmartin (Cambridge)
- John Diffley (London)
- Jan-Michael Peters (Vienna)
- Ray Deshaies (Pasadena)

*3–5.30pm Tea 4–4.30pm*

**BSCB AGM**
*6.30-7pm*

## BSCB 2

**Organelle partitioning during cell division**
Chair: Michael Whitaker (Newcastle)
Invited speakers:
- Steve Taylor (Manchester)
- Michel Bornens (Paris)
- Graeme Warren (Yale)
- Greenfield Sluder (Worcester)

*10–12.30pm Coffee 11–11.30am*

*Lunch and Posters 12.30–2pm*

**Interactions between different cytoskeletal elements**
Chair: Roy Quinlan (Durham)
Invited speakers:
- Bob Goldman (Chicago) ICRF Lecturer
- Ron Liem (New York)
- Andrew Matus (Basle)
- Steve Winder (Glasgow)

*3–5.30pm Tea 4–4.30pm*

## BSDB/GenSoc

**Microevolution of development**
Chair: Enrico Coen
- Paul Brakefield (Leiden)
- David Stern (Princeton)
- John Doebley (Madison)
- David Kingsley (Stanford)
- Susan Lindquist (Chicago)
- Richard Lenski (Michigan)
- Contributed talk

*9am–12.30pm Coffee 10.40–11.20am*

*Lunch and Posters 12.30–2pm*

**Evolution of pattern and form**
Co-chairs: Vivian Irish/Jane Langdale
- Enrico Coen
- Sean Carroll (Madison)
- Contributed talk
- Jane Langdale
- Mark Martindale (Hawaii)
- Michael Akam (Cambridge)

*2–5.15pm Tea 3.30–4.15pm*

**BSDB Waddington Medal Lecture**
*5.30pm–6.30pm*

**BSDB AGM** *6:30-7pm*

*Dinner/Disco; poster prize announcements 7pm*

# Saturday, March 23

**Spindles and cohesions**
Chair: Frank Uhlmann (London)
Invited speakers:
- David Glover (Cambridge) *Yamanouchi Lecturer*
- Elmar Schiebel (Glasgow)
- Antony Hyman (Dresden)
- Tatsuya Hirano (Cold Spring Harbor)

*10–12.30pm Coffee 11–11.30am*

*Lunch and Depart 12.30–2pm*

**Membrane traffic**
Chair: Rainer Duden (Cambridge)
Invited speakers:
- Reinhard Jahn (Goettingen)
- Jennifer Lippincott-Schwartz (Bethesda)
- Charles Barlowe (Dartmouth)
- Sean Munro (Cambridge)

*10–12.30pm Coffee 11–11.30am*

*Lunch and Depart 12.30–2pm*

**Larvae and life cycles**
Chair: Michael Akam (Cambridge)
- Linda Partridge (London)
- Simon Conway Morris (Cambridge)
- Mark Martindale (Hawaii)
- Contributed talk
- James Truman (Seattle)
- David Gems (London)
- Detlev Arendt (Heidelberg)

*9–12.30pm Coffee 10.30–11.10am*

*Lunch and Depart 12.30-2pm*

# Other forthcoming meetings

**The American Society for Cell Biology**
41st Annual Meeting
*8-12 December 2001, Washington, DC*
ASCB
8120 Woodmont Avenue, Suite 750
Bethesda, MD 2081-2755
ascbinfo@ascb.org
www.ascb.org

**Trefoils and Mucins 2002**
3rd International Conference on Trefoil Factor Family (TFF) peptides, and their interactions with mucins
*2– 4 April 2002, Keble College, Oxford*
Details from:
Jan Ward, ICRF, Room 301, 44 Lincoln's Inn Fields, London WC2A 3PX
e-mail: TandM2002@icrf.icnet.uk
www.icnet.uk/conferences/tandm2002/index.html

**Biochemical Society Meeting**
Heriot-Watt University, Edinburgh, UK
*8-10 April 2002*
Topics discussed at this meeting will include aspects of neurogenerative disease; protein transcription, function and structure; the role of tetrapyrroles in biological systems; antibody therapeutics, and cell regulation. This meeting will appeal to diverse range of scientists, and the Society particularly welcomes contributions from young post-graduates.
*www.biochemistry.org/meetings*

**2nd European Life Scientist Organization (ELSO) Meeting**
*29 June – 3 July 2002, Nice, France*
Details from:
Ingeborg Fatscher, PO Box 1151,
Sandhausen, Germany, D-69199
e-mail: contact@elso.org

**MicroScience 2002**
ExCeL, London
*9–11 July 2002*
www.microscience2002.org.uk

*The Royal Microscopical Society is organising a variety of meetings and courses in 2002, in addition to* ***Microscience 2002****. For details, see www.rms.org.uk.*

**XVIIIth FECTS (Federation of the European Connective Tissue Societies) meeting**
*27–31 July 2002, Brighton Centre, Brighton*
Details from:
Dr JC Lewthwaite
Department of Veterinary Basic Sciences, Royal Veterinary College, Royal College Street, London, NW1 0TU
jlewthwaite@rvc.ac.uk

**BSCB Autumn Meeting 2002**
Cell behaviour (5th Abercrombie Meeting)
*15-18 September 2002, St Catherine's College, Oxford*
Organizers: Peter Clark, Anne Ridley, Michelle Peckham
Contact: p.clark@ic.ac.uk

**Signalling the Future**
*3–6 September 2002, University of Liverpool*
Details from: Huw Rees
reeshh@liv.ac.uk
www.signal2002.com

**18th International Pigment Cell Conference**
*9–13 September 2002, Egmond an Zee, The Netherlands*
http://users.raketnet.nl/ipcc/

**The International Society of Differentiation 12th International Conference on Cancer and Development**
Neurobiology and Cellular Microenvironment
*14-17 September 2002, Lyon, France*
www.package.fr/ISDmeeting2002.html

**Techniques in Molecular Biology**
University of Hertfordshire (UK)

www.herts.ac.uk/natsci/STC

*Organized by:*
Department of Biosciences
University of Hertfordshire
College Lane, Hatfield,
Herts AL10 9AB, UK.

*Molecular Biology Update*
A four-day lecture/laboratory course
25–28 March 2002, Hatfield, Herts UK
Details and application forms from:
Dr Virginia Bugeja.
tel: (01707) 285948 fax: 286137
v.bugeja@herts.ac.uk

*Molecular Biology: Basic Terms and Techniques*
A one-day laboratory/lecture course
26 June 2002, Hatfield, Herts UK
Details and application forms from Dr Ralph Rapley.
tel: (01707) 285097 fax: 286137
R.Rapley@herts.ac.uk

*RNA Extraction and Analysis*
A one-day laboratory/lecture course
4 July 2002, Hatfield, Herts UK
Details and application forms from:
Dr Ralph Rapley.
tel: (01707) 285097 fax: 286137
R.Rapley@herts.ac.uk

*PCR Methods and Applications*
A one-day laboratory/lecture course
5 July 2002, Hatfield, Herts UK
Details and application forms from:
Dr Ralph Rapley.
tel: (01707) 285097 fax: 286137
R.Rapley@herts.ac.uk

# Honor Fell Travel Awards

## Jointly funded by the BSCB and the Company of Biologists

Honor Fell Travel awards are made to provide financial support for young BSCB members to attend meetings. Applications are considered for any meeting relevant to cell biology. The amount of the award depends on the location of the meeting. Awards will be up to £250 for UK meetings, up to £350 for European meetings and up to £450 for meetings in the rest of the world.

Applications (including a copy of the meeting registration form) should be sent to: Kathryn Ayscough (Division of Biochemistry and Molecular Biology, Davidson Building, University of Glasgow, Glasgow G12 8QQ) using a copy of the form below. Awards will be given throughout the year. The following rules usually apply (at the discretion of the Committee):

- Awards are not normally made to applicants aged over 35 years.
- Applicants must have been BSCB members for at least a year.
- No applicant will receive more than one award per year or three *in toto*.
- The applicant must be contributing a poster or talk.

---

## Application for an Honor Fell travel award

Name: .....

Age: .....

Work address: .....

.....

.....

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

E-mail address: .....

Degrees (with dates):

.....

.....

Present position (graduate students give start year of PhD): .....

.....

.....

Date of joining BSCB: .....

Membership number: .....

Record the years of previous Honor Fell awards (if any): .....

Key publications (2) or research interests:

.....

.....

.....

.....

Meeting for which application is made (Title, place, date): .....

.....

.....

Estimated expenses: Travel: .....

Subsistence: .....

Registration: .....

Other: .....

Have you submitted any other applications for financial support?: YES NO

If yes, please give details: .....

.....

Number of meetings attended last year: .....

*Copies of the meeting registration form and the abstract being presented should accompany the Honor Fell application*

**Supporting statement by Head of Department:**

The applicant requires these funds and is worthy of support

Name: .....

Signature: .....

Applicant's signature: .....

Date: .....

# Application to join the BSCB

Please complete and return along with a signed Direct Debit mandate to:
Margaret Clements, Department of Zoology, Downing Street, Cambridge, CB2 3EJ.

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

Position: ..... Male/Female

Academic qualifications: .....

Email: .....

Telephone: .....

Fax: .....

Address: .....

.....

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

Research interests: .....

.....

Membership of other societies:

.....

| *BSCB Member* | Proposer | Seconder |
|---|---|---|
| Name: | ..... | ..... |
| Membership Number: | ..... | ..... |
| Signature: | ..... | ..... |

*Applicants without proposers should enclose a brief CV*

The society has an searchable database of its members on the BSCB web page; if you wish your details to be included tick here ☐

The BSCB occasionally sells the mailing list of members to other organisations, this is a valuable source of income to the BSCB; if you **do not** wish your details to be included tick here ☐

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

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**Schools Liaison Officer**
David Archer
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Tel: 0118 926 4494
e-mail: d.archer@cwcom.net

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

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

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

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

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

**Deadlines:**
For the final version of articles and other materials and adverts is 1 April for publication in June and 1 October for publication in December. Please note the first version of any material must be received by the editor at least 2 weeks prior to this deadline so that any changes can be made.

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For further information on commercial advertising contact: Margaret Clements, BSCB assistant, Department of Zoology, Cambridge University, Downing Street, Cambridge CB2 3EJ.
Tel: +44 (0)1223 336655 Fax: +44 (0)1223 353980,
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*Overseas members paying by bankers draft:*
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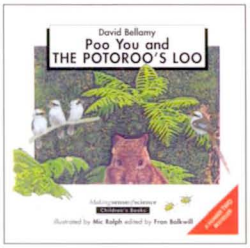


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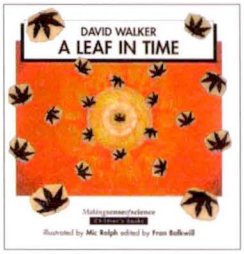


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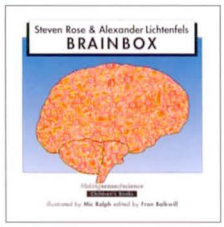


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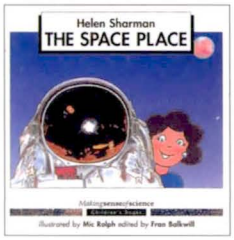


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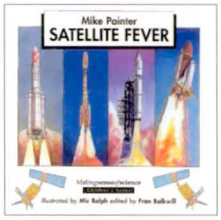


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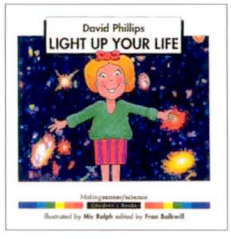


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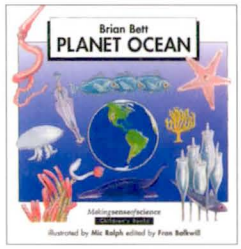


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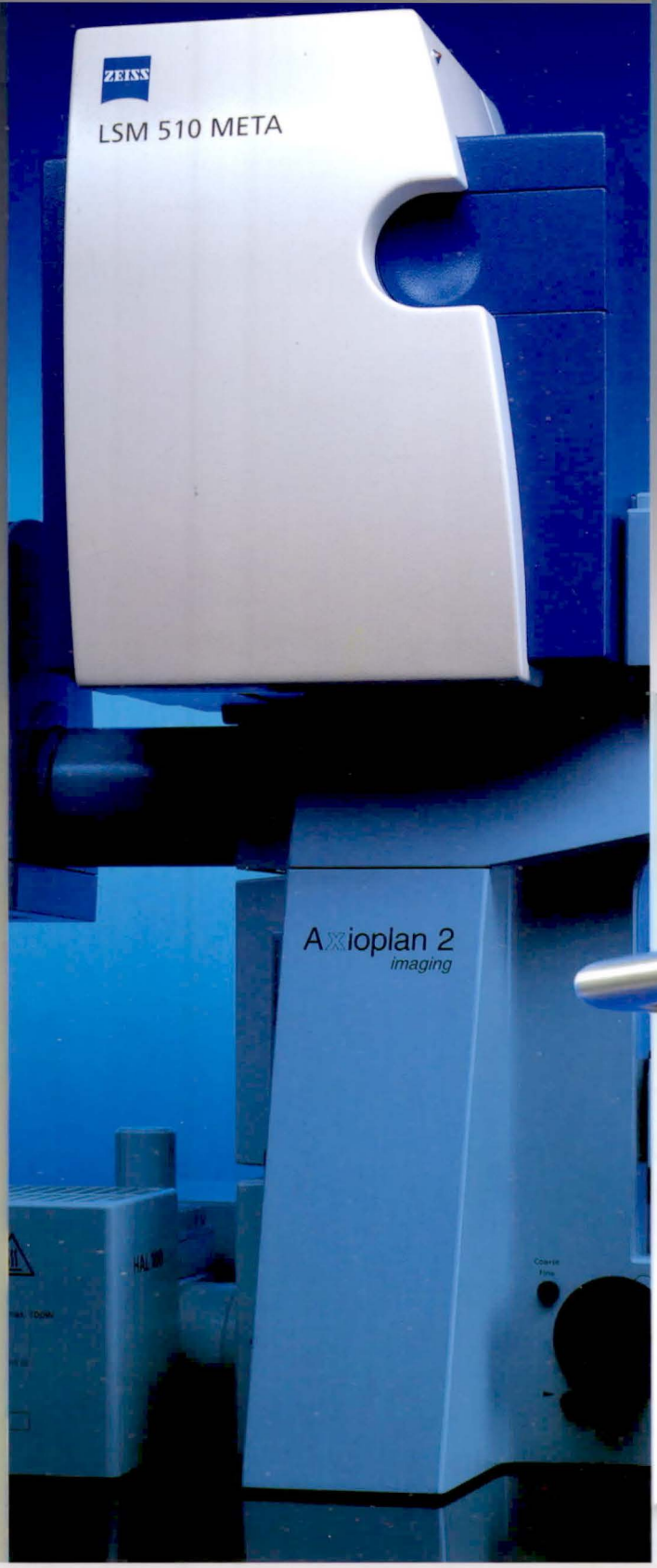


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