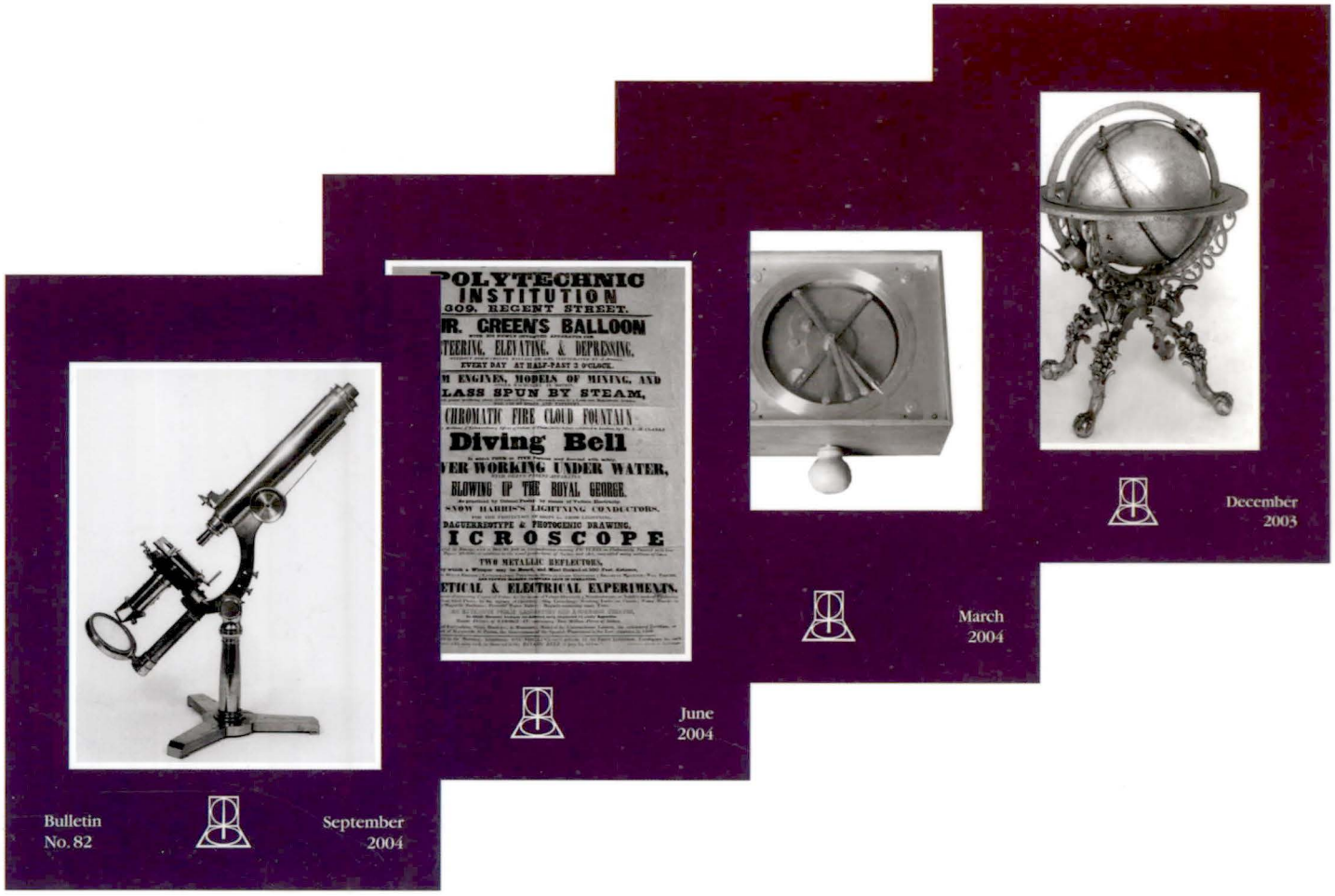

BSCB Newsletter

Winter 2004

British Society for Cell Biology

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Barloworld Scientific

BSCB Newsletter
Winter 2004

Editorial

This is a real bumper issue. We have some excellent features, starting with a brief description of the Scientific Instrument Society, whose publications grace the cover. Viji Draviam gives an account of being a post-doc in the US – a path several people may be contemplating. We then have two articles addressing the use of animals in research: Philip Connolly reports on the Coalition for Medical Progress, of which the BSCB is a member. Chris Langley describes the work of the Dr Hadwen Trust and its recent Science Review.

There are some very interesting book reviews and my thanks as usual to all the authors. We also have a good selection of meeting reports, some by people who are becoming regular contributors, such as Paul Andrews and Sarah Cant. Many of the trips described were funded, at least in part, by Honor Fell Travel Awards: don't forget that you can apply for these to attend conferences. There is a long report on the Meiosis meeting in Newcastle, which first appeared in EMBO reports and is reproduced here with their kind permission.

The Spring Meeting will be held in Warwick, jointly with the BSDB again after our separation last year. There is a huge programme with the general theme of The Asymmetric Cell and you are strongly urged to attend. Details near the back of the newsletter.

The Editor

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News

Features

Book reviews

Meeting reports

Forthcoming meetings

Society business

Forms

News

Hooke medal 2005: Frank Uhlmann

This year's Hooke medal has been awarded to Frank Uhlmann for his outstanding work on chromosome and segregation in yeast. He will present the medal lecture during the Spring meeting in Warwick.

Frank started his scientific career studying Biochemistry at the University of Tübingen, followed by a PhD at the Memorial Sloan-Kettering Cancer Center in New York with Jerard Hurwitz investigating the enzymology of human replication factor C. He then joined the laboratory of Kim Nasmyth at the Research Institute of Molecular Pathology in Vienna as a post-doctoral fellow, where he discovered the protease separase that cleaves cohesin to trigger chromosome separation in anaphase.

In August 2000, Frank was appointed head of CRUK's Chromosome Segregation Laboratory in London.

Lister Institute Research Prizes

For the past 20 years, the Lister Institute has operated a prestigious Senior Research Fellowship scheme. The awards always attracted applicants of the highest quality and over 60% of eligible former Fellows have been promoted to academic chairs.

The Institute is now switching to the award of Research Prizes. These will provide outstanding young scientists with the opportunity, as Lister Institute Prize holders, to develop their potential by giving them flexible funding of £150 000 over a three-year period. The Institute accepts applications from any young scientist, both clinicians and non-clinicians, with guaranteed employment. The research topic is of the applicants own choosing and can be in any of the biological, medical or clinical disciplines, but it should lead to greater understanding in or have implications for the field of preventive medicine.

Initially, two Research Prizes will be awarded; it is intended that numbers will increase in subsequent years. People interested in applying for 2005 may find the information on *www.lister-institute.org.uk*

BSCB Meetings in 2005

The **Spring meeting** will be held at Warwick University in April. The full programme is available on page 26. Key lectures include The Borden Lecture, which will be given by Cori Bargmann, The CRUK Lecture, to be given by Doug Green, and the Society's own Hooke medal lecture (see above).

There will also be two special lunches, following the very successful trial of this idea last year: one is on Careers in Biological Sciences and one on Women in Biology.

The Autumn meeting will be held in October at Heriot Watt University, near Edinburgh. The title is 'Signalling and cytoskeletal dynamics during infection' and it is being organized by Michael Way.

BSCB committee

We need several new committee members for this coming year. 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. Committee meetings are held at the Spring meeting, then once or twice more during the year.

In brief...

Lord Sainsbury willing to listen to Cell biologists
After his visit to the BSCB Spring meeting in 2004, Lord Sainsbury has expressed his willingness to receive any comments that Committee members may wish to make to him, via his assistant, Alison Austin. Therefore, if you wish to address anything to the Science Minister, contact a member of the BSCB committee.

Henry Sun
Those of you who attended the Warwick conference in 2003 may remember an excellent plenary lecture by Henry Sun. He published the essence of his talk in review form in the July 2004 issue of Nature Reviews Molecular Cell Biology. This article is excellent and will be of interest to both students and PIs alike.

NEW Publisher for *Biology of the Cell*
From 1 January 2005, Portland Press Limited will publish *Biology of the Cell* on behalf of its joint owners: the Société Française des Microscopies and the Société de Biologie Cellulaire de France. *Biology of the Cell* publishes articles of original research on all aspects of cellular and molecular biology and cell physiology that make a significant contribution to our further understanding of the mechanistic relationships that govern cellular functions.

Where are they now?

A number of BSCB members have active subscriptions but we don't have their current addresses (Newsletters have been returned undelivered). If you can help, please send details to Margaret Clements at BSCB@zoo.cam.ac.uk

Abbott, Johanna K.R.
Abedi, Dr. H.
Adams, Dr. R.R.
Atkinson, Susan J.
Barry, Dr. Simon
Barton, Dr P.J.R.
Beck, Prof F.
Bennett, Dr J.P.
Betson, Martha
Bishop, Anne
Boulton, Dr M.
Bowers, Katherine
Boyd, Dr Y.
Broackes-Carter, Fiona
Burgess, Dr R.J.
Burke, Dr J.F.
Buss, Dr F.
Cambray-Deakin, Dr M.
Cambrey, Dr. A.D.
Carballido-Lopez, Rut
Cheng, Kin Yip
Clarke, Dr. Emma
Clelland, Dr J.D.
Clissold, Dr P.M.
Coates, J.A.
Cook, Neil R.
Corfe, Dr. B.M.
Coutinho, A.P.
Coverley, Dr. D.
Cowley, E.
Cox, Dr L.S.
Crisp, Dr. M.
Da Silva, R.P.
Dammerman, Alexander
Daniels, Dr. R.H.
de Bettignies, Augustin
Deakin, A.
Dealtry, Dr G.B.
Dobson, Dr. C.B.
Donaldson, Mary M.
Drummond, S.P.
East, Lucy
Edgar, Dr. D.H.
Edwards, R.L.
Emery, P.
Engles, Alison
Evans, Richard
Fagg, Dr. Lisa A.
Fairley, Elizabeth
Flight, Monica H.
Gardiner, Fiona
Giannini, A.L.
Glenn, D.
Green, Kirsty A.
Grose, R.
Hall, Dr S.
Hanley, J.G.
Harris, Brett S.
Haynes, L.
Hesketh, Dr. J.
Hoare, Dr S.M.
Hola, Dr J.M.R.K.
Hola, Dr J.M.R.K.
Howard, S.J.
Howell, Gareth
Hutchison, Dr. C.J.
Ivings, Lenka
Jackson, Dr D.A.
Jacobs, Dr H.T.
Jazayeri, Ali
Job, Dr. C.
John, Dr H.A.
Johnstone, Dr A.P.
Jones, Richard J.
Jordan, G.
Kemp, Dr R.B.
Keshav, Dr S.
Krybasik, Davia
Lamb, J.
Landy, Timothy A.
Longbottom, Esme R.
Lowrie, Dr D.B.
Machesky, Dr. L.M.
Mackay, Ruth
Mankouri, H.W.
Manneville, Dr. S. Etienne
Manneville, Jean-Baptiste
Marshall, Damian
McDougall, Dr. Alex D.
McIntosh, Dr L.C.
McKeague, Anne L.
McMichael-Phillips, Dr D.
Millo, Hadas
Moore, William
Munn, Dr E.A.
Munro, Dr S.
Murant-(Smith), Dr S.J.
Nash, Dr. J.A.B.
Nikbakht, N.
Noble, Dr. P-J.M.
Norbury, C.
Norris, W.E.
Orme, Dr. Mariam
Pagliocca, Adelina
Parnaik, R.
Paterou, Athina
Patten, Dr. I.K.
Pearce, Andrew
Pidoux, Dr. Alison
Prigmore, Elena
Prinjha, Dr R.K.
Puligilla, Chandrakala
Roberts, Dr G.P.
Robertson, A.M.
Ross, Heike
Saint-Jore, Claude M.
Sarkar, Mitali
Schatzmann, Franziska
Scott, Charlotte
Scott, Dr V.
Smythe, Dr C.
Sproul, Dr. Anne
Stanton, H.
Stern, Irit
Stevens, D.R.
Tata FRS, Dr J.R.
Taylor, Dr J.
Thomas, Fay
Ursell, Elizabeth
Vemuri, Dr. S.
Vernon, Dr. Ellen G.
Walker, Donna M.
Wasmeier, C.
Waters, Dr. Catherine
Weber, Roberta
West, Dr M.R.
Wheeler-Jones, Dr. C.
Wilkie, Gavin
Wilkinson, Prof P.C.
Williams, Dr E-J
Wilton, Dr. J.C
Woolner, Sarah E.
Wright, Prof N.A.
Wroblewski, Lydia E.

In brief...

Cheaper journal subs for members

Did you know that BSCB members are entitled to discount subscriptions for several journals? Details are on page 40.

Honor Fell Travel Awards

Young BSCB members, either PhD students or post-docs, attending scientific conferences relevant to cell biology are eligible to apply for financial support in the form of an Honor Fell travel award. Full details are on the application form at the end of the Newsletter. Jordan Raff is now managing the Awards programme. Key points to note are that all applicants must present a poster or talk at the meeting they attend. We also ask all successful applicants to write a short report of their trip for the newsletter.

Funding for local meetings

The Society is prepared to provide limited financial support for meetings organized by any local interest group relevant to cell biology. Requests for funds should be sent to the Treasurer, Mark Marsh (see page 38), accompanied by a report of a previous meeting. If a meeting receives such support, a report of the meeting will be required for publication in the Newsletter.

BSCB Membership Database

The website contains the facility to search for members of the Society. However, under the Data Protection Act, we can include your details only if you specifically grant us permission to do so. If you wish to be included and are not, please contact Margaret Clements (BSCB@zoo.cam.ac.uk).

The Scientific Instrument Society

Many who spend a working life using scientific and technical instruments develop a fascination with the history of their development, the varied forms which they take and the role they have played in the growth of science, medicine and technology.

The Scientific Instrument Society (SIS) exists to provide a forum for these interests. Based in the UK, it has around 500 members world wide. About a quarter of the members are academics drawn from university Departments of the History of Science or museum curators, and another quarter have commercial interests as dealers in antique instruments or as auctioneers. However, half its members are simply attracted to the various types of instruments and many of these are collectors. This is truly a 'Learned Society'; it does not have a commercial interest and the members are united by the love of the subject.

The interests of members encompass all sorts of instruments such as Surveying, Drawing, Dials and Astrolabes, Optical (including telescopes, microscopes and physical and chemical instruments), Medical and Surgical, Electrical and Educational Instruments. The periods covered range from antiquity to the immediate past.

The SIS has a programme of meetings with both invited speakers and contributions from members. Although centred in London, these meetings are held in different places around the country and many members enjoy the chance to broaden their knowledge and meet others with similar interests.

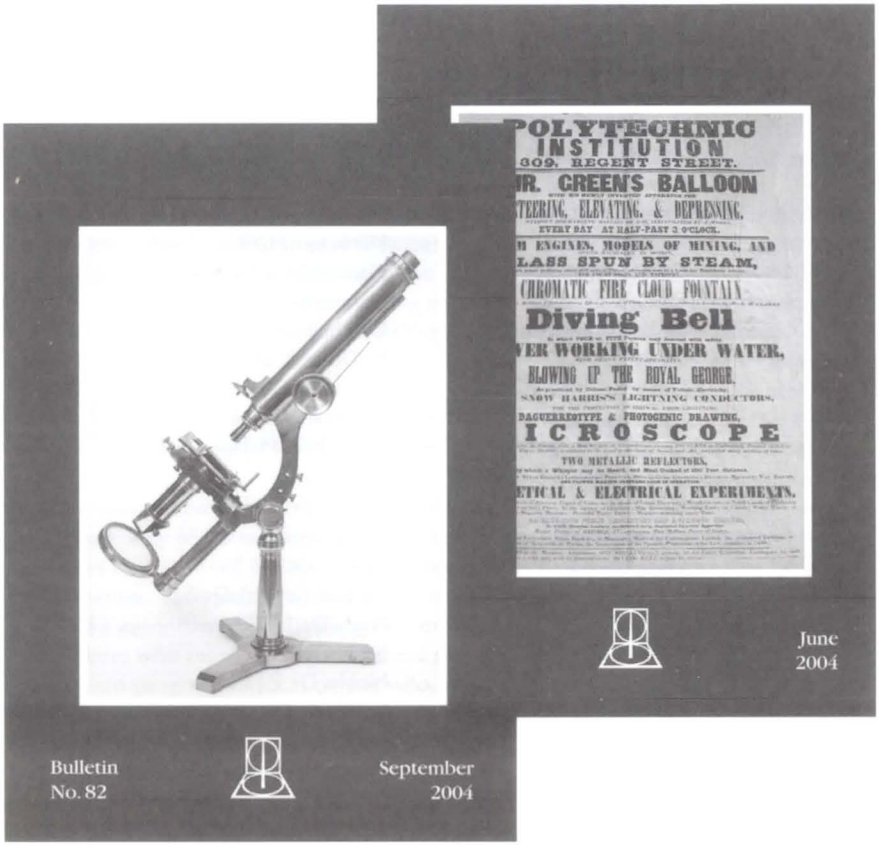
The journal, *The Bulletin of the Scientific Instrument Society*, is published four times a year. It contains informative articles about a wide range of instruments as well as book and exhibition reviews, news of SIS activities and meetings of related societies. There is a classified advertisement column, and antique dealers and auction houses regularly take advertising space, so that collectors may find the Bulletin a means of adding to their collections. The Bulletin is free to members and is the only publication of its kind in the world.

A popular activity involves study tours and visits at home and abroad. The Society's standing and membership means that it is usually possible to arrange for the attendees to go behind the scenes in major museums and to see and handle fascinating items in the extensive reserve collections that are not on general exhibition. Overseas visits are arranged in places that make pleasant interesting trips in their own right, which further enhances the value of seeing the fascinating objects that are being studied, and may cater for companions with different interests. Overseas visits have been made in recent years to Copenhagen, Northern Germany, Northern Italy and Lisbon.

The annual membership fee is £40, family membership is £45 and students pay £20. Other rates apply to non-UK residents. New members receive back copies of the Bulletin for the year in which they join. The only qualification for membership is an interest in the subject!

By Patrick Mill
Scientific Instrument Society

Membership forms can be down - loaded from the Society's web site (www.sis.org.uk) or obtained by post from: Scientific Instrument Society, 31 High Street, Stanford in the Vale, Faringdon, Oxon SN7 8LH, England.

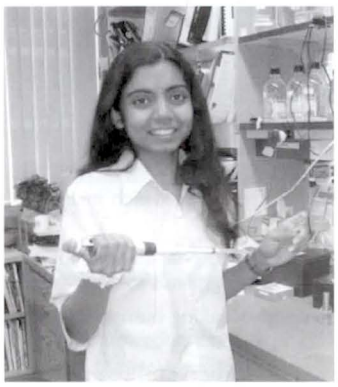


Whither do we go for postdoctoral research: UK or USA?

'No one spearheads a scientific revolution on their own. Not Planck, not even Einstein'.
Graham Farmelo, It must be beautiful.

There is no one ideal place for post-doctoral research training. With many well-equipped research institutes across the globe and with scientists on the move from one place to another, there are multiple cul de sacs to do good science. Yet subtle differences across cultures, in work ethics and thought processes, add novel dimensions to science and make a place perfect for one kind of science but perhaps not the other.

By Viji Draviam, MIT, Cambridge, USA. viji@MIT.EDU



Post-doctoral years are precious ones, since one progresses out of the blank/black immunoblot realm with better experimental skills yet one is free from the burdens of finding funding and thesis writing. It is therefore crucial to decide where one can best spend these years. Sadly, there is no clear-cut answer – at least in this article! Instead, I intend to use my brief exposure to the Cambridges of the UK and the USA to illustrate the impact of social structure in influencing the nature of research across countries. For the above reason, the following will be better seen as a description rather than an exposition.

While the media does its best in exposing us to global trends and a multitude of cultures, living in a foreign land has its own charm in exposing us to the vagaries and idiosyncrasies of a different nation. Having recently watched an American movie, Super size me, I agree that from conferences to scientific funding structures, the 'super-size' industrial style of work culture prevails on the North American continent. On the one hand, the concentration of large ventures (for example, in a small place like Cambridge, USA) promotes a rich environment for interdisciplinary research and such endeavour has proven to be productive in many scientific disciplines. On the other hand, concentration of any kind can have a negative effect by fuelling intense competition.

In the UK, one does not realise that the Atlantic Ocean that separates Europe from the Americas is indeed enormous. Life in the UK, at least in good old Cambridge, is relatively relaxed. Between the coffee breaks and beer hours, it might appear as if there is very little time to complete any useful experiments. However, if used appropriately, such a relaxed system offers plenty of hours to come up with outrageously creative models and (im)possible paradigms.

In general, doing science is like an artist creating a masterpiece – a deluge of creative garbage appears before the true worthwhile finding. The right amount of 'pressure-to-perform' is crucial. Moreover, productivity as described by peers being the driving force in any nation, it has its own influence on the nature of science as well. This immediately leads to the next question: Does the research system in one nation nurture more discoveries than that in another? Using the history of discovery as a scale, it seems as though both systems create their own breakthroughs but the fields in which they sparkle are markedly different.

When I was greeted in less-than comprehensible English at Boston airport, I knew I had travelled far from the UK for my postdoctoral research. A sustained exposure to immigrants has moulded most Americans to be receptive to the difficulties of foreigners. For those who are exploring foreign grounds for training, such a social structure is the best they can ask for.

Most prominently, working in a foreign country provides a unique opportunity to introspect. Issues once taken for granted either appear to deserve more appreciation or are suddenly subject to being questioned. Although all our publications are unified by internet resources such as PubMed, giving us a feeling of proximity, a preference for one kind of science over another differs across countries – largely influenced by culture.

The impact of culture on living, especially on research, is one of the beautiful parts of learning in moving across continents.

Cells pave the way forward

We certainly live in exciting times. Today the world faces an unprecedented range of challenges – from global climate change to newly emerging human diseases, from the impact of the nanotechnologies to problems of environmental degradation, and a whole lot more beside. Readers of this Newsletter will be aware of the role that they as cell biologists play in understanding how cells rule the world. In one way or another, cell biology has an important role to play in meeting these challenges, even the thorniest.

By Chris Langley

Since Victorian times the public, the likes of you and I as well as those who would not recognise a mitochondrion from an accordion, have had an opinion on the subject of animal experiments, and it remains in the news today. The use of animals and the validity of animal experiments in research are frequently put under the microscope. A 1999 MORI poll undertaken on behalf of the Medical Research Council reported that 91% of those questioned agreed that 'there needs to be more research into alternatives to animal experimentation'.

The legislation controlling the experimental use of animals in Europe, including the UK, makes clear that non-animal alternatives should be fully investigated before animals are used. The Home Office licence application process requires a search for non-animal methods, or at least refinement and reduction of the use of animals. Alternatives come in a variety of guises – many of which call upon the ingenuity, expertise and expanding knowledge base of cell biologists.

Cell and tissue culture approaches to experimental questions are the most obvious area where cell biology can lend its expertise, but epidemiology, imaging, computer and mathematical modeling all call upon cell-based analyses and insights in one way or another. Over the past 20 years those in toxicology have pushed forward – in places fuelled by the public's demand – a broad range of non-animal methods which have achieved regulatory status. Needless to say, cell biologists played their part here too.

A national centre to progress the Three Rs (replacing, refining and reducing animal experiments) was recommended by the House of Lords Select Committee on Animals in Scientific Procedures in their 2002 report. The Government recognised the need for such a national centre and has launched one under the chairmanship of Lord Turnberg. Such a centre will serve as a stimulus to tap into the best UK expertise in a range of disciplines including cell biology and also coordinate a national research initiative to seek alternatives. But the driving force behind alternative approaches to the use of animals has come in large part from the small, publicly supported humane research charities. A leader in this field is the Dr Hadwen Trust based in Hitchin.

In its latest Science Review, the Trust describes a portfolio of excellence in research which includes:

- the use of human cell lines to characterise and identify mutagens and aneugens
- the support of a ground-breaking human tissue bank
- the development and evaluation of three-dimensional live cell imaging models for brain tumour therapies
- 3-D cell modelling of breast cancer *in vitro*
- *in vitro* investigation of gene therapy enhancement of radiotherapy by altered radioprotection.

Even the most cursory glance through the Science Review will show the reader that such non-animal research possesses not only cutting-edge relevance but also the potential for new and effective therapies. Some of those challenges which opened this article are being addressed with Trust funding together with the insight and flair of cell biologists. For instance, funding from the Trust in the late 1990s allowed research to be undertaken on genetically modified human lymphoblastoid cells to assess the effects of a range of potential mutagens. This assay, the *in vitro* micronucleus test, was designed to detect two key kinds of chemical mutagenesis: the formation of micronuclei and the abnormal segregation of chromosomes during cell

For a free copy of the Dr Hadwen Trust's Science Review 2004, e-mail the Trust: info@drhadwentrust.org.uk or call 01462-436819, see also: www.drhadwentrust.org.uk

division, which can result in aneuploidy. These chemical-induced disruptions have been linked with human reproductive failure and carcinogenesis.

In vitro mutagenicity tests need a source of metabolic activation to identify those chemicals that are harmless until converted in the body to mutagenic metabolites. Commonly, an exogenous source is added in the form of a rat-liver S9 fraction. This is not ideal, as it is toxic to cells during longer exposures and may not replicate the suite of human (as opposed to rat) metabolising enzymes. The Trust's funding led to the development of protocols for conducting the *in vitro* micronucleus test with human cell lines, such as MCL-5, that are genetically modified to stably express four human cytochrome P450 enzymes as well as microsomal epoxide hydrolase.

The *in vitro* micronucleus test, used with and without metabolic activation, has been extensively evaluated in the last few years and is now considered ready for consideration by the Organization for Economic Collaboration and Development as a test guideline.

The proposed new European Union scheme for chemical regulation will result in a significant increase in animal testing, especially for existing chemicals. This will severely stretch the testing capacity of European industry as well as resulting in a publicly unacceptable increase in the use of animals. Novel *in vitro* alternatives are essential.

Another project featured in the Trust's Review concerns the biological activity of human brain tumours and the interaction between normal brain and tumour cells in real time using two *in vitro* models and state-of-the-art imaging techniques.

This is only a brief view of the potential of *in vitro* methods to approach some of the challenges which face us today. These approaches address some of those problems we mentioned earlier, in ways which are exciting and satisfy the public's wish to see non-animal alternatives flourish.

Chris Langley
Science Sources Consultancy
clangley@crowsnest70.fsnet.co.uk

The Coalition for Medical Progress

One challenge when it comes to communication is that we humans have no problems holding on to seemingly contrary notions and values. It's difficult to place us into neat boxes so that communicators can then devise the perfect message to pierce that box. This is true of individuals and it is true of groups of ostensibly similar people too.

By Philip Connolly

The following comments were made by a well-defined group of people about the use of animals in research:

"I have become increasingly aware of animal intelligence, social behaviour and sensitivity. We are the barbarians."
"Surely animals also have rights being living creatures on this earth just like us?"
"Causing a mouse to suffer is as bad as causing a human to suffer."

Five hundred of this same group of people were surveyed[1]. 91% of them agreed testing new drugs on animals aided medical progress, 83% agreed to some or a large extent with safety testing new drugs on two species, and 86% of those with a view also considered British law provides adequate protection for animals to some or a large extent. On the face of it quite a confusing picture. The group, by the way, was hospital doctors.

For the public at large, MORI research in 2002 showed that 87% of the British public can accept animal research provided alternatives are used if available, suffering is minimised and it is for medical benefit. However, the same survey revealed 83% would not be surprised if animal experiments went on without an official licence. At the very least, a lack of trust in something they believe has merit.

The Coalition for Medical Progress (CMP) came into being in 2003 in order to try and illuminate the vexed subject of research using animals. Our goal is quite simply to address public concerns, which, as we have already seen, are shared by all sectors of society. At the launch, it had some 20 members drawn from the public sector, charities and industry. That has now risen to over 30. Government, too, has supported our work.

Why? Because in our more challenging world public acceptance cannot be taken for granted. The days of "trust me, I'm a doctor" are over. Patients, shareholders, donors, taxpayers, voters and others all have a right to know more about controversial work that is being done in their names. The problem is, of course, that the threat of physical violence from the extremist end of the animal rights spectrum makes speaking out problematic, to say the least.

One way the risks can be reduced is by more scientists and institutions engaging with this issue. CMP helps to bring this about through its programme of media stories, its website and the public meetings it holds. Getting representatives from different sectors to share a platform not only reduces the risks for all, but reminds the audience that animal experiments remain a vital part of biomedical research for all sectors. They are a mainstream option that provide valuable information, which for the foreseeable future at least, is obtainable no other way.

CMP works closely with other players such as the Research Defence Society, focussing more on public views than on shaping the environment for animal research. So, whereas the RDS, which is a member of CMP, will lobby for changes to the law to protect those involved with animal research, CMP seeks to highlight the use of alternatives and non-animal methods, animal welfare and, of course, the medical benefits that are assisted by the *in vivo* work.

In doing this we do not attempt to take over this challenge from our members – the whole point is to get biomedical research as a whole more involved. Rather, we seek ways to bring people together, help members with their own programmes and share good ideas and experiences.

The CMP website (*www.medicalprogress.org*) is a fund of news about how scientists and their laboratories do meet public expectations and how they are making real progress to advance medical knowledge and practice.

Philip Connolly, Director CMP
pconnolly@medical-progress.org

1 Medix for Hospital Doctor magazine October 2004
2 "The use of animals in medical research" 2002

Book reviews

Genomics Applications in Human Biology
Sandy B. Primrose and Richard Twyman

As the avalanche of genome data grows daily, the next challenge is to use this vast reservoir of information to explore how DNA and proteins work with each other and the environment to create complex, dynamic living systems. Systematic studies of function on a grand scale (functional genomics) will be the focus of biological explorations in this century and beyond. These explorations will encompass studies in transcriptomics, proteomics, structural genomics, new experimental methodologies and comparative genomics.

This book provides an overview of biotechnology and genomics, covering technological developments, applications and their ethical implications. It is divided into three sections, the first of which introduces the role of biotechnology and genomics in medicine and sets out some of the technological advances that have been the basis of recent medical breakthroughs. The next section takes a closer look at how biotechnology and genomics are influencing the prevention and treatment of different categories of disease. The final section describes the contribution of biotechnology and genomics to the development of different types of therapy, including conventional drugs, recombinant proteins and gene/cell therapies.

The book is well illustrated in black and white and also features several categories of boxed text, including history boxes describing the origins and development of particular technologies or treatments, molecular boxes featuring the molecular basis of diseases or treatments in more detail and ethics boxes which discuss the ethical implications of technology development and new therapies. References to appropriate sections in two other popular books, also authored by Sandy Primrose and Richard Twyman, are included: *Principles of Gene Manipulation* and *Principles of Gene Analysis and Genomics*.

In summary, *Genomics: Applications in Human Biology* is a topical book showing how the new science of genomics is adding impetus to the advances in human health provided by biotechnology. Written with thought and attention to provide the necessary overview of each subject, this book is an excellent basis for competent undergraduates who already have a basic understanding of genetics and molecular biology to pursue further study into human disease, cancer and new therapies.

Mark Howard, Department of Physiology, University of Liverpool. m.howard@liverpool.ac.uk

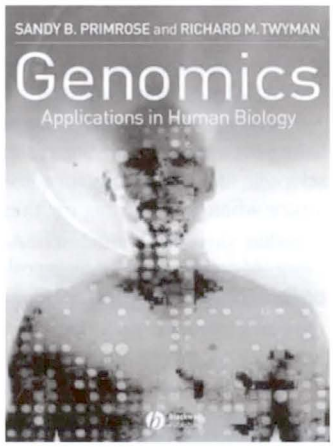
How to Write and Illustrate a Scientific Paper
Björn Gustavii

This book is aimed at writers of scientific papers of all levels from novice to expert and contains tips to assist in the preparation of a paper. The main body of the text is divided into chapters, each of which covers a separate section of a paper, including how to present the results and structure the methods. In addition, there are chapters on more general points, ranging from how to write a covering letter to choosing a title. There is also advice on such things as how to generate interest with an opening sentence.

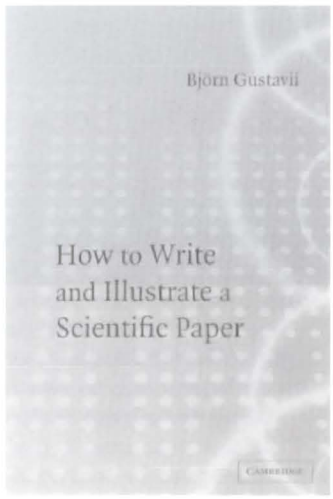
The book is easy to read and is well structured. The author makes good use of examples to illustrate various points. A bad example is shown first, followed by details of how to improve it and then a good example. The examples are often light hearted and humorous and have been taken from actual journal articles, although only the good examples are referenced.

One chapter is dedicated to correcting proofs, with a comprehensive list of correction marks commonly used; this is useful as most postgraduates will not have come across these. There are several chapters that cover different aspects of scientific styles, including the mechanics of scientific writing, types of referencing and using appropriate abbreviations. The book provides a list at the end detailing further reading and references.

There are a number of chapters which cover how to illustrate a paper, with extensive information on preparing and designing tables and graphs. This section is very useful and well presented and it is particularly effective here to have a bad example and



Genomics Applications in Human Biology
Sandy B Primrose and Richard Twyman
Blackwell Science 0632059540
November 2001



How to Write and Illustrate a Scientific Paper
Björn Gustavii
Cambridge University Press 2003
Paperback 0-521-53024-5
Hardback 0-521-82323-4

good example to compare. It would, however, have been useful to include a section on producing, labelling and using pictures or photographs for figures, although the author does include two references for further reading in this subject matter. Although the book is aimed at biology and medical students, almost all of the examples used are from medical papers; fortunately, they are easy to understand.

Overall, I found this book to be enjoyable and well written. It is an ideal reference book to have at hand when writing and organising many types of scientific literature. I am sure it will be useful in the future when I am writing my thesis.

Laura Wagstaff, School of Biological Sciences, University of East Anglia. Laura.Wagstaff@uea.ac.uk

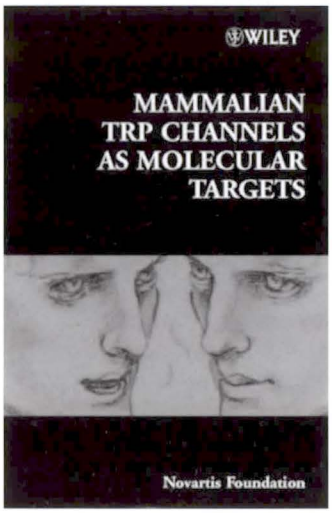
The Great Ideas of Biology
Paul Nurse

This small booklet comprises the text of the Romanes Lecture delivered before the University of Oxford on 30th October 2003. In it, Paul Nurse discusses the history and significance of what he sees as the four great ideas of biology: The Cell, The Gene, Evolution by Natural Selection and Life as Chemistry. He finishes by considering what he thinks might become the fifth great idea, Biological Organization.

Beautifully written, this is a delight to read, regardless of your knowledge of biology – clear enough for beginners and sufficiently erudite for experts.

Joan Marsh

The Great Ideas of Biology
Paul Nurse
OUP 0199518971. 2004



Mammalian TRP channels as Molecular Targets
Novartis Foundation Symposium 258
John Wiley & Sons 2004
0470862548

Mammalian TRP channels as Molecular Targets
Novartis Foundation Symposium 258

Ion channels are critical constituents of the homeostatic machinery of eukaryotic cells. The TRP family of proteins are a recent addition to the catalogue of well known members of this family, such as sodium, potassium, chloride and voltage-gated calcium channels.

Although first identified as key components of the signal transduction pathway underlying the response to light in *Drosophila* eye, TRP proteins have been implicated in many different aspects of cellular ion homeostasis. Despite the relatively rapid identification of a large number of genes encoding these channels in species ranging from yeast, worms and flies to mammals, several aspects of the biology of TRP channels, in particular their mechanism of activation, remain controversial and poorly understood.

Recently, the Novartis Foundation hosted a closed door discussion meeting at which a small group of selected scientists, some working on TRP channel function, presented their most recent data and discussed long-standing controversies in the TRP field. This book contains the presentations made at that meeting as well as an edited transcript of the discussions that followed.

Although titled 'Mammalian TRP channels as molecular targets', the book is neither exclusively about mammalian TRP channels nor is any significant section of it devoted to the use of these proteins as "molecular targets". Rather, almost all the chapters discuss different aspects of the basic biology of TRP channels. What the book does achieve, albeit to a limited extent, is to lay out in formal publication format some of the more controversial aspects of TRP channel research. As stated in the chairman's introduction, the participants sought to achieve a level of agreement on what they disagreed about.

While this book is of interest to those scientists with an ongoing interest in calcium signalling and TRP channel aficionados, it does very little to entice biologists with other interests that might be related to TRP protein function into the field. The nature of the formal presentations is more akin to peer-reviewed publications and the discussion sections are often rambling in nature, sometimes appearing completely unrelated to the preceding presentation. The book has very little to offer readers looking for an insightful discussion of the potential of TRP channels as therapeutic targets or for clinical scientists who might be interested in the involvement of these channels in human molecular pathology. However, it does represent a valuable collected resource, annotated with references, for those involved in TRP channel research and could in the future be a milestone in the development of what is still a very young and immature field.

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A Practical Guide to Developmental Biology

Melissa A. Gibbs
Oxford University Press 0199249717

At first glance this book left me a little disappointed. It seemed that the topics in each chapter could have been discussed more thoroughly and there were too many diagrams and pictures. A more thorough investigation revealed that the illustrations do complement the experimental protocols, facilitating the interpretation of the experimental manipulations. Similarly, further reading is suggested where appropriate. In fact, the more I read of this book, the more I came to the conclusion that it is first rate and manages to convey its message with the minimum of fuss. The best description would be to call this a textbook that has been sent to fat camp for the summer and has lost the weight of excess content that isn't key to its practicality. This is a lean trim textbook.

Covering a wide variety of experimental organisms, including plants, the manual follows the sequence of most developmental biology textbooks: axial patterning, plant cell totipotency, fertilization, early plant development, morphogenesis, cell adhesion, embryogenesis, gametogenesis, regeneration, and metamorphosis in a very concise, no-nonsense format.

This lab manual is designed to give students experience with a wide variety of model systems currently in use by developmental biologists. Experiments range from classic slide or whole animal observations to more modern immunohistochemistry and the manipulation of gene expression. All these experiments are described in detail and the appendices provide recipes, needed chemicals, and sources for all aspects of the book.

At the end of each practical chapter are questions based around the material presented, encouraging the idea that this book could be used by upper level undergraduates and for graduate practical classes. With this in mind, a minor gripe is that it would have been very handy if a small concise pull-out of bullet point answers to each of the questions was included for use by those poor souls marking the work of the masses of students.

In short, this book describes a range of techniques and provides a solid foundation in classic practical developmental biology. It allows students the means to learn how to handle and manipulate a variety of embryonic organisms and describes them in a succinct and proficient manner.

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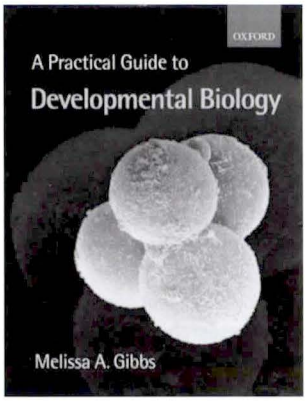

A Practical Guide to Developmental Biology
Melissa A. Gibbs
Oxford University Press
0199249717

Chromosomes: Organization and Function
Adrian T. Sumner
Blackwell Publishing Ltd., 2003
0-632-05407-7. Paperback

Chromosomes: Organization and Function

Adrian T. Sumner

This book is both an excellent aide memoir for experienced researchers and lecturers as well as a good text for people new to this field of research or for final year undergraduates in the cell and molecular biosciences. The book is clearly written with a good selection of additional information sources, including seminal works in the field and useful web sites for those who wish to delve deeper into the subject. It is also well indexed, which makes it very useful for quick reference of a particular topic or dipping into just one area.

It is written by Dr Adrian Sumner, a highly skilled chromosome expert whose electron microscope images of chromosomes are fantastic. Indeed, at a recent Royal Society meeting on chromosome segregation, one of the presenters illustrated a point with an image published by Dr Sumner in 1991, demonstrating how important his discoveries are in this exciting area of research.

The book starts with a brief historical perspective that will be particularly useful to readers new to this topic. The chapters cover all the important areas of eukaryotic chromosome structure and function. For example, chapter 2 describes the dynamic nature of mitosis and meiosis and the timing of cellular events and is illustrated with several very clear cell cycle schematics. The chapter on 'DNA, the genetic code' has a post-genomic flavour; it covers the C-value paradox and gives clear definitions of the various types of repetitive DNA such as LINEs and SINEs. Another chapter outlines how different species deal with sex determination at a chromosomal level.

This is a clear, well written book that uses a good comparative approach, referring to many model organisms. Throughout the book, Dr Sumner highlights important unanswered questions, which will be particularly valuable to readers new to this area. The book is clearly illustrated with some amazing images. I will certainly be using and recommending this book.

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Cell Motility

Anne Ridley, Michelle Peckham, Peter Clark

Cell motility has been studied since the dawn of cell biology; indeed, van Leeuwenhoek considered motility to be the defining characteristic of microscopic life. As microscopes improved, and the theory of cells emerged, pioneers of cell biology, like Ilya Metchnikoff and Ross Harrison, described the motions of cells, but could not elucidate their mechanism. We can date the dawn of the modern age of cell motility research to the 1970s and Michael Abercrombie, whose careful analysis of cells crawling around culture dishes established many of the concepts that are the foundations of our field, including the motility cycle and contact inhibition.

Since then, those foundations have served to support an ever greater understanding of the mechanisms of cell motility. It is therefore fitting that the field's quintennial gatherings to survey the field are named in his honour; this book was developed from the fifth such Abercrombie Symposium, held in September 2002 in Oxford.

The book covers five broad themes. The first, of course, is actin dynamics. The development of the dendritic nucleation array treadmilling model is one of the great biochemical triumphs in cell motility; the core mechanism is clearly and succinctly presented in the opening chapter, whilst the regulation of Arp2/3 by the WASp/Scar family of proteins is dealt with in no less than three later chapters. Remodelling of actin structures is also addressed, in chapters on myosin I and villin. The second theme is cell adhesion, both to the extracellular matrix and to other cells. Aspects of adhesion to the extracellular matrix examined include the role of FERM domains in their assembly, the interplay of actin and microtubules in their lifecycle, the role of the protease calpain in their creation and destruction and their dynamics *in vivo*. Cell–cell interactions are covered in terms of the coordination of cadherins and the actin cytoskeleton during junction formation, and the function of ephrins in the choice between adhesion and repulsion.

The third theme is polarity – the problem of how cells decide where to go. There are chapters dealing with three signalling modules responsible for polarity: the mechanism by which EGF receptor signalling (as a model for receptor tyrosine kinases more generally) defines a leading edge, the effects of Rho GTPases on the polar microtubule cytoskeleton and the GPCR-controlled PI3K/PTEN machinery for generating a PIP3 gradient across the cell. The fourth theme is membrane traffic. There are two chapters: the first is on ARF6, which is involved in polarised exocytosis, and the second is on dynamin, which coordinates actin and membrane dynamics. The final theme is cell motility in the context of development. One chapter takes a mechanical approach, looking at how cell movement can squeeze a tissue into shape, whilst the other covers the signals controlling the migration of neural crest cells. Finally there is also a chapter on the techniques which have made so much of this work possible – the latest developments in fluorescence imaging.

This book, then, constitutes a status report for cell motility research; it does not aim to educate its readers in the basics of the field, but rather to bring them up to date with the latest developments – it's current affairs rather than history. As such, it is a collection of more or less independent articles; this inevitably means that some matters are covered several times and some not at all, but it gives it the great strength of being timely and focused, qualities which, along with its admirable conciseness, make it of outstanding value to those working in the field, be they novice graduate students trying to find their bearings or seasoned researchers in need of a glimpse of a wider horizon.

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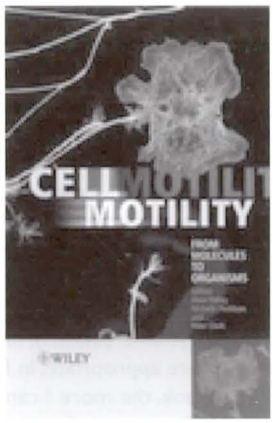

Cell Motility
Anne Ridley, Michelle Peckham, Peter Clark
0-470-84872-3
John Wiley and Sons, 2003

See page 14 for details of discount copies

Books for review

Fancy reviewing a book? If so, choose one from the selection listed below. Alternatively, if there is a book you would like to review that is not included here, contact me (jmarsh@wiley.co.uk) and I will request a review copy from the publisher.

From DNA to Diversity *Carroll, Grenier and Weatherbee*, Blackwell Science

The Nucleolus *Olson*, Kluwer Academic/Plenum Publishers

Centrosomes in Development and Disease *Nigg* Wiley VCH

Cancer and Inflammation *Novartis Foundation Symposium 256* Wiley

Reversible Protein Acetylation *Novartis Foundation symposium* Wiley

Nuclear Organization in Development and Disease *Novartis Foundation symposium 264* Wiley

Stem cells: nuclear reprogramming and therapeutic applications *Novartis Foundation symposium 265* Wiley

Database Curation *Lesk*, Wiley

Ecological Genetics *Lowe, Harris and Ashton*, Blackwell Science

Fundamental Bacterial Genetics *Trun and Trempy*, Blackwell Science

Analysis of Genes and Genomes *Reece*, Wiley

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Domains in Integrins *Gullberg*, Kluwer Academic/Plenum

Advanced Genetic Analysis, *Hawley & Walker*, Blackwell Science

Molecular Infection Biology: Interactions between microorganisms and cells *Hacker & Heesemann*, Wiley

FEBS special meeting on cytoskeletal dynamics: From cell biology to development and disease

This annual conference aims to bring together scientists from all areas of cytoskeletal research. In June 2004, it was held at the Biomedicum in Helsinki, Finland.

By Stephen Smith

Thanks to a BSCB Honor Fell travel award, I was lucky enough to attend this year's FEBS special meeting in Helsinki. The five-day conference attracted around 200 scientists from various fields to share their work and knowledge on cytoskeletal dynamics. The relatively small size ensured a friendly atmosphere and time for all the participants to speak to each other.

After an evening buffet reception in the University, the conference began in earnest Sunday morning, bright and early at 8.30am. The opening talk was given by **Marie-France Carlier** (CNRS, France), who described her laboratory's work on the α-thymosin/WH2 domain and its ability to function within proteins as either an inhibitor or promoter of actin assembly.

Bob Robinson (Uppsala University, Sweden) then showed structural studies of how gelsolin binds actin and the conformational changes involved in this process. He also reported how α-thymosin domains bind actin and that the interchange of actin between α-thymosin and profilin is mediated through a minor overlap in binding sites.

These talks were followed by a session on ancient cytoskeletal systems. **Jeff Errington** (University of Oxford) gave a fascinating talk on the bacterial MreB family, members of which have both a similar sequence and function to actin. GFP constructs of these proteins were used to show that they form cable structures around the cell periphery of *Bacillus subtilis* and are essential for cell shape. **Harold Erickson** (Duke University, USA) then presented data on the bacterial tubulin, FtsZ, showing that it forms a contractile ring under the membrane which contracts upon division. Photo-bleaching data highlighted just how dynamic the FtsZ system is.

In the afternoon, **Tadaomi Takenawa** (University of Tokyo, Japan) described the differential localisation and functions of WAVE1 and WAVE2. Using MEF cells from knockout mice deficient in these proteins, he demonstrated that WAVE2 is essential for Rac-induced membrane ruffling but WAVE1 is not. He proposed that WAVE2 induces polymerisation at the leading edge, pushing the membrane forward, whilst WAVE1 constructs a mature, organised actin network behind the membrane.

Monday's sessions began with the focus on cell adhesion and migration. **Danijela Vignjevic** (Northwestern University, USA) presented siRNA data suggesting that the protein, fascin, is responsible for producing the actin bundles in filopodia. **Claire Wells** (Kings College London) then introduced a novel human model for the epithelial–mesenchymal transition. Using HGF stimulation of a human prostate cancer cell line, she revealed cell scattering as well as changes to the actin cytoskeleton, cell substratum adhesions and activity of the Rho family GTPases.

In the afternoon, **Gary Borisy** (Northwestern University, USA) presented work from his laboratory on the control of the lamellipodial to filopodial transition, focusing on the role capping protein plays in this process. Their results suggest that capping protein is required for the development of lamellipodia, whereas Ena/Vasp is required for filopodial formation.

Melanie Barzik (MIT, USA) then presented data on the role Ena/Vasp plays in enhancing actin

filament length and how this is achieved by blocking the binding site of capping protein on actin.

Tuesday had only a morning session owing to an organised boat trip around the beautiful Helsinki area in the afternoon. There was still time for a cytokinesis session which allowed **Rene Medema** (Netherlands Cancer Institute) to show data on how CLIP-170 localises to the kinetochore at prometaphase, aiding microtubule stabilisation during mitosis.

The final day concentrated on the cytoskeleton in development and the CNS. **Scott Brady** (University of Illinois) began with an overview of his laboratory's work on GSK3 regulation of kinesin-mediated transport. GSK3 phosphorylation of kinesin light chain removes it from its cargo, allowing regulation of retrograde and anterograde transport. He also reported how Tau filaments activate GSK3, preventing kinesin transport and suggesting a possible link to Alzheimer's disease.

Andrea McClatchey (Harvard, USA) then presented data on the roles that ERMs and merlin (NF2) play in tissue morphogenesis and cell-cell communication and how disruption of these functions may contribute to tumour progression. NF2-deficient cells do not undergo contact-dependent inhibition of proliferation or form stable adherens junctions, suggesting a potential role in cancer.

Throughout the conference, afternoon poster sessions were held. Posters from all areas of cytoskeletal research were present and it was interesting talking to groups about the work they were doing and particularly the various imaging techniques being used to visualise the cytoskeleton. I presented a poster on the regulation and activation of PAK1 in mouse bone marrow macrophages and received both positive feedback and some good ideas on how to progress with my research.

I would like to thank the BSCB and all the people at the conference for making it a wonderful experience.

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2nd World Union of Wound Healing Societies Meeting: Paris, July 2004

This meeting was co-hosted by the European Tissue Repair Society, the European Pressure Ulcer Advisory Panel, the European Wound Management Association and the Société Française et Francophone des Plaies et Cicatrisations. Forty-three other worldwide partner societies were represented. We were all able to attend this mammoth meeting thanks to BSCB Honor Fell Travel Awards.

By Alice Beare

After bad weather caused flight delays from Manchester, we arrived in Paris at nearly midnight the night before the conference began. It seemed only moments later that we were heading for the Palais de Congrès and attempting to register. The presence of 4800 conferees caused some confusion, and negotiating a 100-stand exhibition hall and up to eight concurrent sessions required exceptional directional and organisational skills.

Professor **Mark Ferguson** initiated proceedings with a description of the process of taking an anti-scarring therapy from discovery to clinical practice. Other early sessions included Infection, Dressings, Skin Grafts and Tissue Engineering. The topics discussed varied from **Andreas Zisch's** intelligent biomaterials for promotion of angiogenesis to **P. Bowler's** role of bacterial communities in wound healing. The short time allowed for each speaker did limit the depth of discussion but overall they certainly provided insights into the research and clinical aspects under investigation a round the world.

Much of the meeting focused on the chronic wounds (leg ulcers, diabetic ulcers, pressure sores) that tend to develop in elderly and immunocompromised patients, the number of which is increasing as the world's population ages. There is much debate about the most suitable approach for treating these difficult wounds; in the plenary session, **Keith Harding** from Cardiff asserted that a full and complete diagnosis and individualised treatment regime is necessary for each patient. No two chronic wounds are alike and the patient's attitude to what is an acceptable outcome when a chronic wound is finally healed must be taken into consideration when devising suitable treatment.

The treatment of burns during the earliest stages following injury was addressed in French by **D. Wasserman**. He described how the evaluation of the severity of injury is critical, as is initial treatment at the scene, with cooling of smaller burns of major importance. For burns of greater surface area, prevention of fluid loss and maintenance of the airways are the most important treatments. Burns were also discussed by **Robert McCauley**. His surgical intervention in severely contracted burn scars produces incredible results, with most patients experiencing amazing improvement in their mobility and quality of life.

The tissue engineering sessions tended to focus on artificial skin substitutes of varying kinds. These have been developed over the past 15 years and have had some success clinically. **Esther Middlekoop's** group has developed Suwelak, a collagen and elastin matrix that improves the 'take' of split thickness skin grafts and gives a less severe scar. Improvements are still necessary before this

Below: David Warde and Emma Woods in the Exhibition Hall at the conference.

substitute will be ready for routine clinical use. **Thomas Hunziker** has taken a different approach to skin substitutes by growing autologous outer root sheath keratinocytes into a differentiated sheet that can be placed (with the aid of a silicone membrane) onto a well-granulated wound bed in order to promote reepithelialisation. He has seen good results in venous leg ulcers, but needs to see considerable improvement before the product, Epi-Dex, can be used routinely.

While skin substitutes are used to improve poor healing and surgical techniques are used to minimise bad scars, many researchers are still working to comprehend the processes involved in "normal" wound healing. Until we understand how the body responds to injury under a normal situation, we won't be able to understand what happens in a pathological situation.

William Li gave an extremely interesting seminar on what can be learnt about tumour angiogenesis by examining angiogenesis in non-pathological conditions. Tumours can only metastasise when they become fully vascularised and connected to the circulation. However, tumour vascular architecture is not normal as the vessels have chaotic blood flow and are hyperpermeable, indicating that the remodelling and control processes that occur as vessels grow are very important. The recruitment of endothelial progenitor cells to the developing vascularity from the bone marrow and the extent of their contribution are still under investigation.

From our contingent, **Emma Woods** spoke about her work on allogeneic fibroblast persistence in murine incisional wounds, **David Warde** presented studies on the effect of hair cycle stage on wound healing, and **Hayley Willis** described her work on blood-borne fibrocytes and their differentiation *in vitro* into endothelial progenitor-type cells. All the presentations by our group were well received, with useful questions and informed discussion.

Unfortunately, the posters did not make up a significant part of the meeting. While there were several hundred scattered along the corridors of the venue, no time was allocated for poster sessions. As a result, it was not possible to speak to the poster presenters as we never knew when they might be at their poster. Many of the posters dealt with the assessment of novel dressings and their usefulness in the clinic. Others addressed the non-medical needs of the patient when in treatment for chronic wounds, while still more described the fundamental biological research that ultimately leads to the development of new wound healing products and techniques.

Above: Emma Woods in Paris

The diverse nature of the meeting allowed academic researchers such as ourselves to see the clinical end product of our work, while the clinicians could learn about the science behind the products they use. The pharmaceutical and bioscience companies provided entertainment (and advertising) in the form of sponsored symposia complete with goody bags and dancers, and there were plenty of free pens and notepads on offer in the exhibition hall.

The length (6 days) and intensity (8am-7:30pm) of the meeting tended to cause brain overload, but we did manage to make the most of our time in Paris, with the major sightseeing successfully accomplished, and the excellent Parisian summer sales thoroughly examined.

We would like to thank the BSCB for providing us with funding and the UK Centre for Tissue Engineering for additional expenses.

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Voice of Young Science: Communicating scientific research via the media

In September, 35 postgraduate and postdoctoral scientists attended the first Voice of Young Science event at the Science Media Centre, London. The one day conference, organised by Sense About Science and aimed specifically at younger scientists, was intended to combine discussion about media reporting of science-related issues with practical guidance for communicating with the media.

The day began with a participant discussion on the changing image and role of science and scientists in the public domain, led by three researchers whose work had recently been highlighted by the media. **Adam Finn** (University of Bristol) considered how recent vaccine scares have been reported and the lack of public trust that has arisen following such stories. He concluded that it was communication, rather than science itself, that is the current challenge facing scientists. **Rachel Batterham** (University College London) and **Carly Stevens** (The Open University, Milton Keynes) related their experiences after publishing papers that had generated worldwide media interest. The attention their work received was largely positive, but they advised any researcher facing a journalist for the first time to rehearse what they had to say beforehand and to be aware how their answers may be portrayed.

During the discussion, the concerns most young scientists had about coming into contact with the media were expressed. These mainly focused on fears over misrepresentation of facts and the "sexing up" of stories by journalists. Many people voiced worries of having their comments manipulated to fit a particular angle and of attention-grabbing headlines that detract awareness from the facts.

In the second session, these fears were put to a panel of science journalists: **Anna Fazackerley** (Times Higher Education Supplement), **Tom Feilden** (BBC Radio 4's Today programme), **Mark Henderson** (The Times) and **Alex Kirby** (BBC News Online). They explained that, in a world of 24/7 news availability, stories have to be arresting and interesting to non-specialists. The requirement for immediacy and the competition with other world news puts pressure on science correspondents to come up with engaging features in a limited timeframe. This meant that they look for counter-intuitive stories about relevant issues that appeal to a large audience.

Crucial to a science feature, however, is the input of scientists. All the journalists agreed that if researchers shy away from media interest for fear of misrepresentation, this will be detrimental to science reporting and promote an unbalanced view. They recommended that scientists use clear explanations with plenty of analogies when describing their work and emphasised that science and scientists would benefit from a good relationship with the media.

The final session was conducted by **Fiona Fox** and **Becky Morelle** of the Science Media Centre, who gave practical advice on responding to the media and getting involved in scientific debates. They emphasised that preparation was crucial for getting a point across: providing a well-planned and balanced press release, anticipating questions and offering snappy soundbites were approaches for enabling good coverage. They also pointed out that contact with the media afforded an opportunity to engage with the public and to discuss broader concepts of the science process, such as peer review and benefits to society.

The entire event was informative and interesting and contained advice that could be applied to communicating and promoting scientific issues within many different contexts. Although few in the audience had personal experience of the media, most felt that attending Voice of Young Science had increased their confidence in managing public awareness of their work. I would recommend all young scientists to attend next year's event, whether or not their research will ever hit the headlines.

Sense About Science is a charitable trust, founded in 2002 to promote an evidence-based approach to scientific issues in the public domain. Its objectives are: *To advance the education of the public in any branch of scientific research (including social science) and to disseminate useful information about such research; and To promote (for the benefit of the community) the understanding of, and to stimulate interest in, the creation, presentation and use of scientific research.*
For more information, see www.senseaboutscience.org

The Science Media Centre is an independent venture set up in response to the *Science and Society* report of May 2000. It promotes evidence-based science in the media by finding scientists for journalists to interview, reacting to science in the headlines, and organising press briefings. Scientists can contact the centre if they feel their research area is likely to come up in the news or if they would like to speak out about a headline news issue. For more information, see www.sciencemediacentre.org

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ELSO 2004, Nice, France
3–8 September 2004

After this year's horrendously bad summer in the UK, a conference in the south of France suddenly seemed an extremely attractive prospect. Thankfully, we were not disappointed – by either the weather or the meeting itself. ELSO 2004, which took place in the vast and well-equipped Acropolis Conference Centre in Nice, was a successful meeting, attracting good numbers of participants (although there could, and should, have been a greater presence from UK life scientists) and a huge number of excellent parallel minisymposia. However, the plenary sessions were pretty patchy in quality – the consensus among people I spoke to was that there was paucity of 'big' names speaking.

The opening lecture this year was not a stimulating, thought-provoking or amusing scientific seminar from a famous scientist, but sadly was a pretty dull one from a eurocrat. This decision is somewhat understandable and shows a certain political expediency given the science-funding crises in parts of the EU, but frankly I think this could have been scheduled for later in the conference. To the organisers – please, please do not do this again. In this report I have tried to highlight as much as possible but, given the parallel nature of the minisymposia, I would like to apologise in advance for any omissions and bias in the subject areas covered.

In the subgroup meeting entitled *'Chemical Biology'* we were treated to an eclectic mix of talks. **Steve Taylor** (Manchester, UK) gave an overview of the Aurora kinases and then focused on the importance of the Aurora B protein kinase, highlighting three recently described small-molecule Aurora kinase inhibitors. He went on to present exciting new data on the composition and regulation of the mitotic checkpoint complex.

Jason Swedlow (Dundee, UK) treated us to an overview of the Open Microscopy Environment (OME), an open source software solution being developed jointly between Dundee and groups in the US. OME offers the community a way to overcome many of the difficulties cell biologists have in collecting, visualising, categorising and analysing images and their associated metadata – a critical problem in the analysis of high-throughput cell-based screens.

Above: La Plage. Weather hot, food lovely. Wish you were here, see you soon. (Or maybe not).

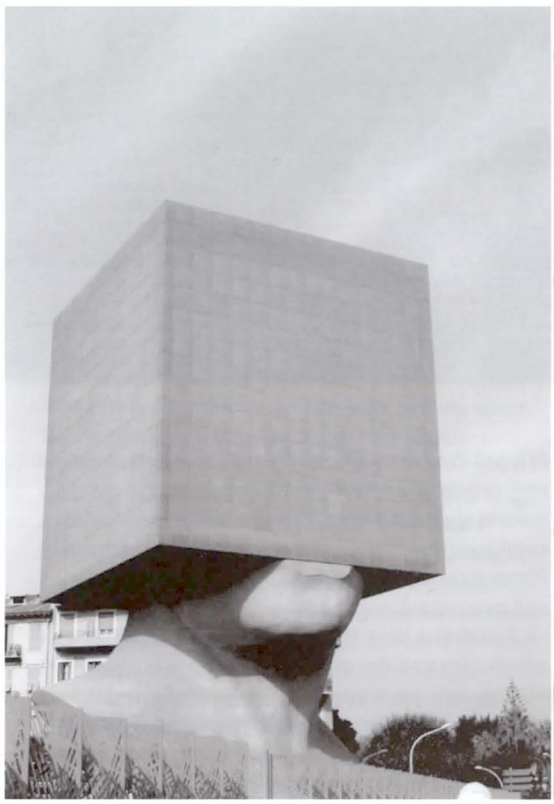
Jeff Paterson (Philadelphia, USA) presented his recent work on the isolation of Wiskostatin, an N-WASP inhibitor, using a high-throughput approach and the latest data on its mechanism of action obtained using NMR. **Carsten Schultz** (Heidelberg, Germany) described the use of FRET-based intracellular probes; one a synthetic probe for measuring PLA2 enzyme activity *in vivo* in real-time; the other, a fluorescent protein-pleckstrin probe allowing measurement of PKC activity.

Markus Koch (Dortmund, Germany) gave an overview of the utility of protein structural similarity clustering, highlighting the importance of natural product libraries for drug discovery. **Thorsten Berg** (Martinsried, Germany) presented

his lab's results from high-throughput screens searching for inhibitors of Myc/Max using a FRET assay and STAT3 inhibitors using a fluorescence polarisation assay.

Thomas Meyer (Martinsreid, Germany) wants to understand the crosstalk between the actin and microtubule cytoskeletons. He described an interesting screen for inhibitors of microtubule plus-end directed motor proteins and then showed some of the phenotypic consequences of the addition of one of their best MKLP2 inhibitors to cells.

Maria Carmo-Fonseca (Lisbon, Portugal), in a plenary lecture, presented exciting data on the important role of the U2AF35 splicing factor in regulating the splicing of cell cycle-specific genes. **Titia De Lange** (New York, USA) gave a superb plenary lecture on her lab's past and current contributions to the understanding of telomere structure, function and regulation.



Above left: Sculpture opposite Acropolis conference centre. Above right: The old and the new.

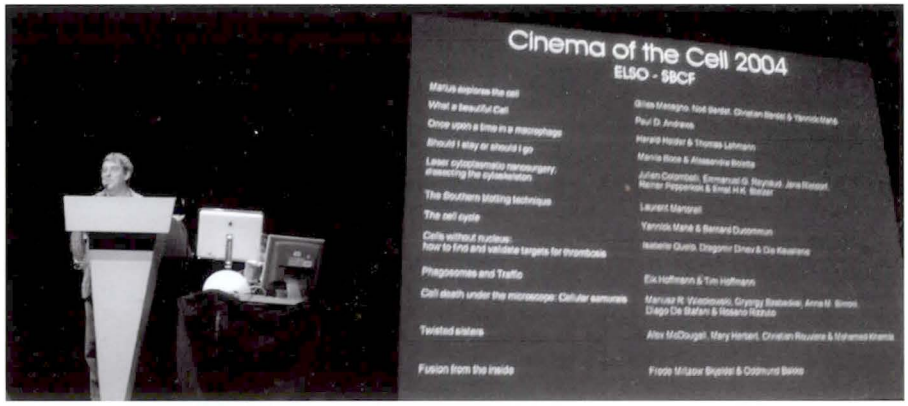
In the *Mitosis* minisymposium, **Frank Uhlmann** (London, UK) kicked off the session with a great talk on an interesting function for the Cdc14 phosphatase in regulating microtubule dynamics during anaphase in budding yeast. **Maurizio Gatti** (Rome, Italy) gave an excellent report of his lab's efforts to genetically define the steps involved in cytokinesis in *Drosophila* and described the phenotypes of a number of new genes.

Bob Margolis (Grenoble, France) discussed experiments on a G1 tetraploidy 'checkpoint' as well as characterisation of the effects of loss of PRC1 on cytokinesis. **Maryse Romano** (Paris, France) presented her EM data on the effects of the ndc10-1 mutation on microtubule length and symmetry in budding yeast. **Katherina Ribbeck** (Heidelberg, Germany) showed some very interesting studies on the NuSAP protein suggesting it has an important role in stability of microtubules.

In the *Actin and Motility* plenary session, **Laura Machesky** (Birmingham, UK) gave a very clear account of their latest work on dissection of the IRS/MIM family of proteins involved in actin polymerisation in lamellipodia. **Rong Li** (Cambridge, USA) gave a erudite presentation of her recent work on the interplay between polarisation and the actin cytoskeleton, with some striking observations on the dynamic mobility of 'scaffold' proteins at the bud site and the influence of Cdc42 GTP/GDP status on this mobility.

In the *Signalling and Disease* plenary session, **Philip Cohen** (Dundee, UK) entertained us with an interesting talk on the insulin signalling pathway, highlighting the importance of understanding the intricacies of kinase networks, including associated feedback loops, in the design and utilisation of small molecule kinase inhibitors for therapy.

In the *Microtubule Motors* minisymposium, **Isabelle Vernos** (Heidelberg, Gernmany) opened with a report of functions for Xklp1 in microtubule stability and instability. **Rob Cross** (Oxted) gave an excellent presentation of different aspects of the mechanism of action of kinesins. He began by focussing on the role of weak vs strong interaction modes and underlined the importance of electrostatic interactions between tubulin's E-hook and kinesin's K-loop for diffusional scanning and trapping. He went on to describe studies on Eg5 kinesin and its mechanism of action and then concluded with optical trap experiments defining the processive movement of kinesin.



Above left: Fishing boats in Nice harbour. Above right: Christian Sardet presenting the cinema of the cell.

Andras Malnasi-Csizmadia (Budapest, Hungary) discussed acto-myosin and **Sandrine Etienne-Manneville** (Paris, France) gave a very interesting talk on the association between APC, EB1 and leading edge microtubules using TIRF microscopy.

I presented my recent findings on the regulation by the Aurora B kinase of both the activity and localisation of the microtubule destabilising Kin I kinesin, MCAK. I proposed a mechanism for the regulation of kinesin function by phosphorylation via the neck/K-loop and provided evidence for the presence of two centromere/kinetochore binding sites for MCAK with phosphoselectivity.

In the *Cell Cycle* minisymposium, **Margarete Heck** (Edinburgh, UK) gave a great presentation on her work on a novel metalloproteinase which appears to link mitotic chromosome organisation to cell migration. **Simonetta Piatti** (Milan, Italy) described her recent data on the role of CDC5 in the mitotic exit network as well as two proteins which show genetic interactions with Tem1. **Toru Hirota** (Vienna, Austria) gave an interesting account of his investigation of the importance of the condensin I and II complexes in mammalian cells.

Michel Bornens (Paris, France) revealed stunning unpublished data probing the physical parameters that determine the axis of cell division. By combining high-resolution printing of patterns of fibronectin onto glass with immunofluorescence and automated image analysis, the group was able to determine how the distribution of underlying matrix dictates the mitotic spindle position.

In the *Biological Networks* minisymposium, Francois Nedelec (Heidelberg, Germany) gave a great introduction to a computer modelling solution to explain the dynamics of the mitotic spindle and the role of motor proteins.

This year's *Cinema of the Cell*, which showcases short multimedia presentations (BioClips), was highly entertaining – if you are interested in seeing them click on www.bioclips.com.

Overall, this year's ELSO conference in Nice was well worth attending. My thanks go to the British Society for Cell Biology for the Honor Fell Travel Award, which went towards the costs. One thing I forgot to mention - the beach was very rocky - remember to pack some flip-flops for ELSO2006.

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Connecting, pairing, exchanging, pausing and pulling chromosomes: Meeting on the cell-cycle regulation of meiosis

The British Society for Cell Biology meeting on the Cell-Cycle Regulation of Meiosis took place in Newcastle, UK, between 13 and 15 September 2004, and was organized by M. Herbert, K. Jones, M. Whitaker and M. Levasseur

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Introduction

The British Society for Cell Biology autumn meeting on the Cell-Cycle Regulation of Meiosis encompassed a unique blend of disciplines from cytology to biochemistry, and covered topics ranging from recombination to human infertility. Meiosis shares much of the same cell-cycle machinery as mitosis, but also includes several unique features and regulatory pathways. As two consecutive rounds of chromosome segregation (meiosis I and II) follow a single round of chromosome replication, four haploid nuclei are made from a single diploid precursor cell. The unique event in meiosis is the segregation of homologous chromosomes (homologues) at meiosis I (Fig 1).

Recombination and meiotic chromosomes

Meiotic recombination mediates two essential processes: the stable pairing of homologous chromosomes during the leptotene and zygotene stages, and the connection of homologues by chiasmata from the diplotene stage through to the anaphase I stage. N. Hunter (Davis, CA, USA) described the molecular events of recombination in *Saccharomyces cerevisiae* (Fig 2; Hunter & Kleckner, 2001; Borner *et al*, 2004). Recombination is initiated by programmed DNA double-strand breaks (DSBs). More than 250 DSBs are formed per meiotic cell, only a subset of which go on to produce crossovers that lead to chiasmata, whereas most form non-crossovers without the exchange of chromosome arms. Along the crossover pathway, the two ends of a DSB interact sequentially with a homologue through two joint molecule intermediates: single-end invasions (SEIs) and double-Holliday junctions (dHJs). dHJs are subsequently resolved to give mostly crossover products. The events that lead to non-crossovers are less clear, although evidence favours the synthesis-dependent strand-annealing mechanism. According to this model, one DSB-end invades a homologue and primes DNA synthesis. The nascent strand is then displaced and anneals to complementary sequences on the second DSB-end to seal the break.

Is the yeast pathway generally applicable to higher eukaryotes? The conservation of recombination proteins, their localization along meiotic chromosomes and the phenotypes of knockouts imply that this is the case. Most persuasively, the timing of the localization of recombination proteins in mice defines four molecular transitions, which parallel the DNA transitions that have been defined in yeast (Fig 2; Moens *et al*, 2002).

Chiasmata, cohesion and segregation. Several talks at the meeting highlighted the link between the number and location of crossovers, and the fidelity of chromosome segregation. Crossover failure carries a risk of aneuploidy (that is, the formation of gametes with abnormal numbers of chromosomes). Less obviously, homologues with a crossover that is located close to either the centromere or a telomere are also susceptible to mis-segregation (Koehler *et al*, 1996). Crossing over might cause a local disruption of sister-chromatid cohesion, which could lead to the premature separation of sister chromatids at the centromere or premature chiasma resolution at a telomere.

Support for the idea that recombination locally disrupts cohesion has been provided by images of diplotene chromosomes, which show that cohesion has been lost at the sites of chiasmata. Consistent with this, R. Jessberger (New York, NY, USA) showed that the cohesin REC8 is specifically absent from crossover sites (Eijpe *et al*, 2003). Local cohesion loss might relieve topological constraints on chromosomal exchange and/or chromosome condensation.

The maternal-age effect. Advancing maternal age is a second aneuploidy risk factor in human females; the aneuploidy level rises to 20% in older women and has an important effect on human fertility, miscarriage and birth defects. The nature of the maternal-age effect is unclear. One theory is that cohesion deteriorates over time. To test this, S. Bickel (Hanover, NH, USA) modelled the maternal-age effect in *Drosophila* (Jeffreys *et al*, 2003). In female flies that were deprived of protein-rich food and male company, oogenesis was arrested and the oocytes 'aged'. An age-dependent increase in mis-segregation was detected, but primarily when the chromosomes were achiasmate and cohesion was compromised. These data indicate that the normally efficient backup system for segregating achiasmate chromosomes in *Drosophila* deteriorates with age.

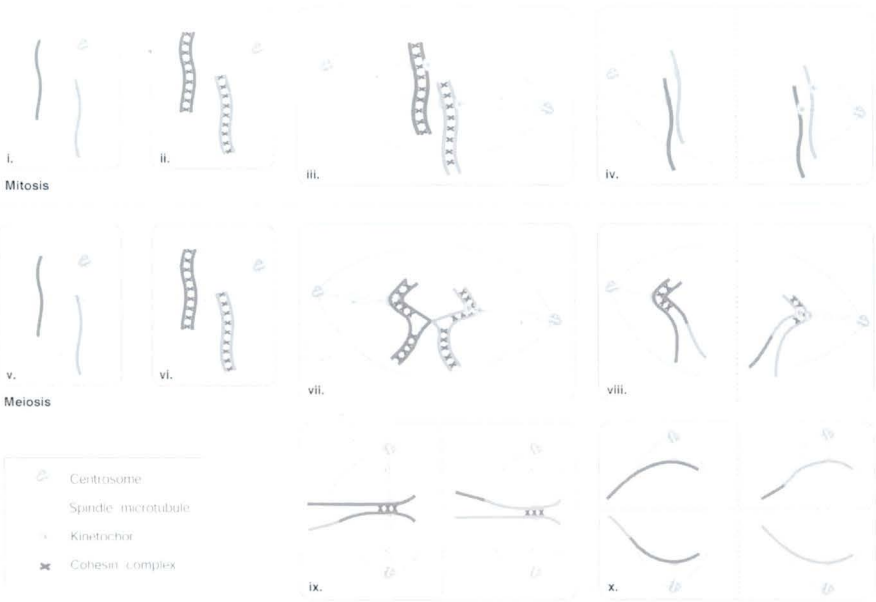

Fig 1: Mitotic and meiotic chromosome cycles. In mitotic cells, connections called sister-chromatid cohesion are formed during replication and hold the sister chromatids together until they are ready to be segregated at anaphase (i–iii). When the two kinetochores of a sister-chromatid pair attach to microtubules that emanate from opposite poles of the cell, the pulling forces of the spindle are resisted by the cohesion between sister centromeres (iii). The resulting tension stabilizes microtubule attachments. When all chromatid pairs have achieved this biorientation on the spindle, sister-chromatid cohesion is destroyed and the chromatids are pulled to the cell poles (iv). During meiotic prophase I, maternal and paternal homologues pair and become connected by chiasmata (v–vii). The combination of chiasmata and cohesion allows the homologue pair to be orientated on the spindle, similar to the way in which a pair of sister chromatids would be aligned during mitosis (vii). When cohesin is destroyed, the homologues are segregated (viii). A second round of segregation then occurs without an intervening round of replication (ix–x). Note that centromere cohesion must be maintained until the onset of meiosis II. Arrows indicate the directions of the pulling forces that are generated by microtubules. Dashed lines indicate the planes of cell division.

An achiasmate segregation system has also been found in yeast (Kemp *et al*, 2004), although the issue of whether there is a similar system in mammals remains contentious. The proteinaceous cores or axes of prophase chromosomes contain the synaptonemal complex protein 3 (Scp3). In female mice that lack Scp3, approximately 30% of metaphase oocytes have achiasmate chromosomes and aneuploidy is increased. As in human females, aneuploidy increases with advancing maternal age in these mutant mice, but not in wild-type mice (Yuan *et al*, 2002). Perhaps, as in *Drosophila* and yeast, achiasmate chromosomes are segregated by a backup system some component of which deteriorates over time. If this is the case, the age-dependent phenomenon should not be peculiar to the *Scp3*$^{-/-}$ mouse; indeed, any mutation that gives rise to achiasmate chromosomes should cause an age-exacerbated increase in aneuploidy.

Recent studies have shown that prophase defects are common among women (M. Hulten, Coventry, UK). P. Hunt (Cleveland, OH, USA) showed that older oocytes often have disorganized meiosis I spindles and a failure of chromosome congression at the spindle equator. In mice, analogous defects and subsequent aneuploidy are caused by mutations that affect oocyte growth (Hodges *et al*, 2002). This supports the idea that advancing age alters the growth environment of maturing follicles and somehow causes congression failure.

Extrinsic risk factors for aneuploidy. Hunt also described the serendipitous discovery that the oestrogenic compound bisphenol A markedly induces aneuploidy in female mice (Hunt *et al*, 2003). A sudden rise in aneuploidy levels was traced to bisphenol A that had leached from damaged polycarbonate cages and drinking bottles. Interestingly, the main effect that is elicited by bisphenol A is congression failure, which is similar to that observed in older human oocytes. Therefore, extrinsic factors, such as exposure to bisphenol A, could exacerbate the intrinsic risk factors of altered recombination and advancing maternal age. The advice is to throw out your polycarbonate food and drink containers!

What is the link between the prenatal events of meiotic recombination and postnatal defects in chromosome congression? Failure to achieve a crossover and premature resolution of distal chiasmata both result in achiasmate chromosomes that might rely on a backup system for segregation. In *Drosophila*, this system is specifically disrupted by mutations that alter spindle morphology and chromosome movement along microtubules (Matthies *et al*, 1999). Therefore, human age-induced changes in spindle morphology and congression might somehow phenocopy *Drosophila* achiasmate segregation mutants. This proposal hinges on the assumption that mammals have an achiasmate segregation system. A rigorous test of this assumption is eagerly awaited.

Proteins that promote crossing over. In somatic cells, crossing over during DSB repair is generally suppressed. By contrast, meiotic cells must ensure that each chromosome pair has at least one crossover. The mechanism of this 'crossover assurance' is unclear; however, proteins that specifically promote the crossover outcome of recombination have been identified. For example, two homologues of the MutS family of DNA mismatch-recognition proteins, MSH4 and MSH5, have such a meiosis-specific role. C. Franklin (Birmingham, UK) presented an analysis of *Arabidopsis msh4* mutants

(Higgins *et al*, 2004). Similar to equivalent yeast and mouse mutants, synaptonemal complex (SC) formation and crossing over are defective in these plants. Interestingly, a residual ~16% of crossovers forms independently of Msh4 and these events are randomly distributed among the chromosomes. These data are consistent with the proposal that there are two classes of meiotic crossovers: class I crossovers that have a regulated distribution to ensure that every pair of chromosomes obtains at least one chiasma, and class II crossovers that occur randomly, perhaps as the occasional outcome of the repair of DSBs that are not normally destined to become crossovers (Copenhaver *et al*, 2002; de los Santos *et al*, 2003; Borner *et al*, 2004).

The SC is the cytological hallmark of meiotic prophase. This proteinaceous structure forms between the lengths of paired homologues during the zygotene stage. SCs comprise two dense lateral elements that flank a central region, which contains a less dense central element. The lateral elements correspond to the rod-like homologue axes along which the chromatin of sister chromatids is organized. Transverse filaments (TFs) lie across the central region to create a zipper-like appearance. H. Cooke (Edinburgh, UK) described the identification of new SC components in the mouse. Synaptonemal complex protein 1 (SYCP1) is known to bridge the central region, and Cooke also introduced two new components, which are confined to the central element of the SC. These proteins might correspond to the pillars that form a ladder-like structure in the SC and could bolster its stability.

The *Sycp1*$^{-/-}$ mouse (C. Heyting, Wageningen, The Netherlands) is the first knockout of a mammalian TF protein. *Sycp1*$^{-/-}$ mice are sterile and males fail to produce sperm. The rare metaphase cells that do form have few chiasmata, which indicates that chiasmata formation is dependent on SYCP1. Beautiful immunostained images showed that chromosome pairing and the initiation of recombination occur normally in *Sycp1*$^{-/-}$ cells, but SCs are absent and progression to the later stages of recombination is defective. Together with studies in yeast, flies and worms, these data indicate a highly conserved function for SC in the maturation of crossover-designated DSBs (Hunter, 2003).

Three talks focused on the assembly and function of axial elements. T-F. Wang (Taipei, Taiwan) showed that the yeast axial protein Red1 undergoes waves of phosphorylation and sumolation throughout meiotic prophase. He went on to present a general model for the role of these post-translational modifications in regulating the assembly/disassembly of macromolecular complexes along chromosomes. Jessberger suggested a role for the cohesin component, structural maintenance of chromosomes 1α (SMC1α), in limiting axial compaction. Chromosomes in *Smc1*$\alpha^{-/-}$ cells make SCs that are 50% shorter than normal (Revenkova *et al*, 2004). This contrasts with data from *Scp3*$^{-/-}$ mice, the SCs of which are twice the length of those in the wild-type mice. Jessberger suggested that the structure imposed by SMC1α might limit the axial compaction function of SCP3. In addition, data presented by A. Kouznetsova (C. Hoog group, Stockholm, Sweden) suggest that the role of cohesins in prophase may be distinct from their function in sister-chromatid cohesion; in *Scp3*$^{-/-}$ mice, the cohesin axis is severely abnormal during prophase, but this does not lead to cohesion defects at later stages. The length and/or composition of axes is important for crossing over, as illustrated by the fact that both *Smc1b*$^{-/-}$ and *Scp3*$^{-/-}$ mice have crossover defects. Even in wild-type meiosis, axis length seems to determine the crossover frequency. Hulten showed that, despite having identical DNA content, chromosomes in oocytes have longer axes and SCs than those in spermatocytes (Tease & Hulten, 2004). Moreover, longer axes/SCs correlate with more crossing over. Two models have been proposed to explain this covariation (Kleckner *et al*, 2003): the first postulates that the number of DSBs is determined by axis length, whereas the second states that axis length determines the fraction of DSBs that will mature into crossovers. In the latter model, the number of DSBs per kilobase will not vary and so DSBs will be denser when the axes are shorter. Therefore, if crossover interference spreads over a fixed length of axis/SC, fewer crossovers will form when the axes are shorter (as is the case in males). Future studies should determine which of these two models is correct and identify the factors that modulate axis length.

Checkpoints V. Boerner of the Kleckner group (Cambridge, MA, USA) emphasized the importance of distinguishing mutations that alter checkpoint monitoring from those that alter the process that is

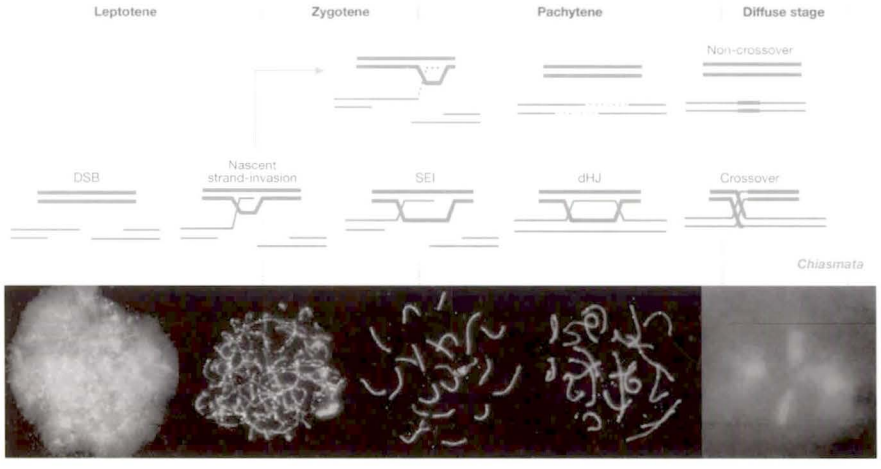

Fig 2: DNA events and cytological landmarks of meiotic recombination. The top row shows the classical stages of meiotic prophase I. The middle row shows the relative timeline of the molecular events of meiotic recombination based on physical assays in yeast, *Saccharomyces cerevisiae* (see main text for details). The bottom row shows the relative timeline of recombination markers in mouse spermatocytes. Each panel shows immunofluorescence images of spread meiotic chromosomes. The appearance and disappearance of immunostaining foci of recombination proteins indicate that the DNA pathway inferred in yeast also applies to mammals. Staining of the histone ɣH2AX and the recombinase Rad51 indicate that double-strand break (DSB) formation and the assembly of recombination complexes occurs during the leptotene stage. The disappearance of ɣH2AX and RAD51, and the formation of MutS homologue 4 (MSH4) foci indicate that strand invasion occurs during the zygotene or early pachytene stages. The appearance of crossover-specific MutL homologue 1 (MLH1) foci parallels the timing of the crossover-specific double-Holliday junction (dHJ) molecules. Crossover formation presumably follows during the late pachytene stage, before the appearance of chiasmata during the diplotene stage (shown in the final panel). Images provided courtesy of E. de Boer, Wageningen, the Netherlands.

being monitored. He illustrated this point through analysis of the yeast pachytene checkpoint 2 (*pch2*) mutant, which suppresses the prophase arrest of cells that lack the SC zinc uptake transporter protein Zip1 (San-Segundo & Roeder, 1999). Pch2 is a member of the AAA-ATPase superfamily, the modes of action of which include the disruption or alteration of macromolecular assemblies. DNA physical assays were used to show that Pch2 alters the recombination process in a Zip1 background, which allows efficient DSB repair and restores some crossovers. Boerner suggested that Pch2 contributes to a regulatory barrier that prevents recombination in the absence of meiotic proteins, such as Zip1. By contrast, N. Bhalla of the Dernberg group (Berkeley, CA, USA) presented equally compelling evidence that *Caenorhabditis elegans* pch-2 is part of a checkpoint that monitors unsynapsed chromosomes. It is unclear how these two seemingly disparate conclusions will be reconciled.

Cell cycle and cohesion

Cohesin. F. Uhlmann (London, UK) opened the cell-cycle session by discussing cohesin, which is a complex of four proteins: the structural maintenance of chromosomes proteins SMC1 and SMC3, and the sister-chromatid cohesion proteins SCC1 and SCC3. According to the prevailing model, cohesin keeps sister chromatids together until the onset of the anaphase stage by forming a ring that captures two DNA duplexes. As pointed out by Jessberger, there could be at least four cohesin-like complexes in meiocytes: SMC1α–SMC3–RAD21–SA1/2; SMC1α–SMC3–REC8–STAG3; SMC1α–SMC3–REC8–STAG3; and an additional complex that is built on the SMC1α–SMC3 heterodimer. These complexes occur at different stages of meiosis and might have distinct functions, including chromosome-arm cohesion, centromeric cohesion and/or the support of meiotic recombination.

The separation of homologous chromosome pairs in meiosis I is known as homologue disjunction. In budding and fission yeasts, this process is dependent on the proteolytic cleavage of the cohesin subunit Rec8 by separase. Whether such a mechanism also operates during meiosis I of higher eukaryotes remains unclear. Observations that arm cohesin is released independently of separase during mitotic prophase, and that anaphase-promoting complex/cyclosome (APC/C) is dispensable in *Xenopus* meiosis I but not II, indicate that cohesin cleavage by separase might not be essential for vertebrate anaphase I onset. Conversely, recent data from mammals indicate that cyclin B and securin destruction are required, and that excess mitosis arrest-deficient 2 (MAD2) protein inhibits exit from meiosis I. This indicates that some aspects of the mechanism are conserved between yeast and mammals. To examine the role of REC8 cleavage in mammalian meiosis, N. Kudo of the Nasmyth group (Vienna, Austria) identified cleavage sites on mouse Rec8 and generated a transgenic mouse that expresses non-cleavable Rec8. He presented evidence that homologues non-disjoin during spermatogenesis of the transgenic mice. However, females expressing non-cleavable Rec8 were still fertile. Kudo also reported oocyte maturation in separase conditional-knockout mice. Again, he showed homologue non-disjunction during meiosis I, even though cyclin-dependent kinase (CDK) activity is reduced at anaphase I. Is it possible that males and females use different mechanisms to segregate their chromosomes? We look forward to the results of further analyses of these mice.

APC/C and cytostatic factor. F. Klein (Vienna, Austria) discussed a negative regulator of APC/C^{ama1} (a form of APC/C that functions in meiosis), which is known as mitotic nuclear division 2 (MND2). Deletion of *MND2* leads to premature securin degradation and catastrophic prophase defects during budding yeast meiosis. In this situation, the Shugoshin protein, which protects centromeric cohesion, also seems to be destabilized. This indicates that Shugoshin degradation is promoted by APC/C^{ama1} during budding yeast meiosis.

Another negative regulator of the APC is early mitotic inhibitor 1 (Emi1). This was proposed to be part of the cytostatic factor (CSF) pathway in *Xenopus*, which ensures that egg development is arrested until fertilization takes place. P. Jackson (Stanford, CA, USA) reported that Emi1 is targeted for destruction by polo-like kinase 1 (Plk1), CDK1 and the α-transducin repeat-containing protein (b-TrCP) ubiquitin ligase, and that the Emi1 degron sequence EDSGVSSF is equivalent to the Plk1-interacting motif. Moreover, Plk1 is required for Emi1 destruction in egg extracts. K. Ohsumi of the Kishomoto group (Tokyo, Japan) showed that overexpressed Emi1 is an unstable protein; however, even when using a different Emi1 antibody, he could not detect endogenous Emi1 in metaphase II eggs. Jackson agreed that exogenous Emi1 is unstable, although he proposed the existence of a stabilizing factor that maintains endogenous Emi1 levels. He noted that there is a similar distinction between endogenous and exogenous protein stability for α-catenin, which is another α-TrCP substrate.

Preventing aneuploidy. Another theme of the meeting was the temporal pattern of destruction of cell cycle-associated proteins and its regulation by spindle-checkpoint proteins. J. Pines (Cambridge, UK) and C. Lehner (Bayreuth, Germany) discussed the temporal order of destruction. Pines reminded us that by inactivating the spindle checkpoint in HeLa cells, both cyclin B1 and securin are destroyed earlier and disappear at the time that cyclin A is normally destroyed. A similar situation occurs during

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female mammalian meiosis I. H. Homer from the groups of M. Herbert and A. McDougall (Newcastle, UK) showed that depletion of MAD2 and/or BubR1 advanced the timing of both cyclin B and securin destruction during meiosis I. This resulted in premature anaphase onset and increased aneuploidy in mouse oocytes. In addition, the hormonal environment of maturing oocytes could contribute to the maternal-age effect. Although it remains unclear why oocytes from human ovaries that are nearing the end of their reproductive life have markedly increased aneuploidy, the hormonal environment and falling levels of spindle-checkpoint proteins might contribute to this problem.

Meiotic gene expression

Gene-expression controls at the level of RNA are crucial for meiosis in animals. A principal regulator in mice is the RNA-binding protein Dazl. Targeted deletion of Dazl prevents mouse germ cells from progressing past the leptotene stage, which indicates that it regulates RNAs that encode proteins that are crucial for this process. The action of Dazl is probably of central importance to germ cells, as it is a member of an ancient gene family. The homologous *Boule* gene also regulates meiotic entry in *Drosophila* by controlling translation of an important cell-cycle regulator. In principle, translational control allows the coordinated regulation of many proteins, and the intriguing question remains as to which and how many RNAs might be regulated by Dazl. By analysing RNAs that were isolated by immunoprecipitating Dazl from pre-meiotic mouse testes using microarrays, and by similarly profiling changes in the RNA populations that were present in *Dazl*-knockout mice just before they showed a phenotype (day 7), N. Reynolds (Edinburgh, UK) identified the mouse homologue of the *Drosophila* gene *Vasa*, which is crucial for meiosis. The mouse Vasa transcript binds Dazl protein *in vitro* and contains sequences that are similar to previously identified optimal Dazl-binding sites. An important question raised by this analysis was one that is relevant to many researchers: how to interpret the mass of information obtained by microarray approaches.

Translational control is also crucial in females as meiosis is interrupted in prophase I, sometimes for many years. Many of the mechanisms that regulate re-entry into meiosis have been discovered in *Xenopus laevis* and involve the control of poly(A) tail length by *cis*-acting signals in the 3′ untranslated region of silenced RNAs, which are known as cytoplasmic polyadenylation elements (CPEs), and the CPE-binding protein (CPEB). CPEB acts as an on/off switch depending on its phosphorylation status. Before meiotic entry, unphosphorylated CPEB prevents translation by binding maskin, which masks the 5′ cap structure-initiation factor 4E (eIF4E) of the silenced messages from the ribosome. On meiotic re-entry, CPEB is phosphorylated and actively recruits cleavage and polyadenylation specificity factor (CPSF) and poly(A) polymerase, which elongate the poly(A) tails of the silent transcripts from less than 20 to more than 150 nucleotides. The binding of poly(A)-binding protein (PABP) in turn destabilizes the interaction of maskin with the cap structure and activates translation by allowing transcript association with polyribosomes. J. Richter (Worcester, MA, USA) discussed how his group have used co-immunoprecipitation and mass spectrometry to identify new CPEB-interacting proteins that are required for cytoplasmic polyadenylation. Crucially, one such protein is a *Xenopus* orthologue of a cytoplasmic poly(A) polymerase that is important in germ-cell development in *C elegans*; it is presumably this protein that actively elongates the poly(A) tail of silenced messages, thereby activating them for translation.

A mysterious aspect of male meiotic gene expression is silencing of the X and Y chromosomes in a transcriptionally inactive structure that is called the XY body. Superficially, this is similar to dosage compensation in female cells, in which one of the X chromosomes is inactivated. X inactivation might not be established during early development, as was previously thought, but rather before birth in the XY body of the father. Meiotic sex-chromosome inactivation (MSCI) requires the phosphorylation of histone H2AX (J. Turner, London, UK) and the ubiquitylation of H2 (W. Baarends, Rotterdam, The Netherlands). These modifications affect the histone code that regulates the transcriptional availability of DNA by altering the chromosome structure. H2AX is phosphorylated to give g-H2AX by the ATM and Rad3-related kinase (ATR), which is recruited to the XY body by the tumour suppressor breast cancer 1 (BRCA1). Surprisingly, all unsynapsed chromosomes or chromosome segments become inactivated during meiosis in male and female mice with sex chromosome aberrations. The silencing of unpaired DNA, as well as XY-body formation, resembles a phenomenon in fungi that is known as meiotic silencing by unpaired DNA.

In conclusion, this meeting brought together mitotic and meiotic cell-cycle and gene-expression researchers who have begun to dissect the cell-cycle regulation of meiosis. In the future, we can expect new information that relates to human health (for example, aneuploidy and its causes) to merge with important new data about the basic cell and molecular biology events that regulate meiotic division.

Acknowledgements

Many thanks go to the meeting organizers and particularly M. Herbert for her tireless efforts in organizing this captivating event.

BSCB/BSDB Joint Spring Meeting
Warwick University 6–9 April 2005

Venue

University of Warwick
Conference Park
Central Campus
Coventry
CV4 7AL
Tel: +44 (0) 24 7652 3222
www2.warwick.ac.uk/conferences/

On the BSCB website...

Registration form
Abstract submission
Travel directions

www.bscb.org

Programme

Wednesday 6 April

15:00 – 20:00	Registration
15:00 – 19:00	BSCB/BSDB Committee Meetings
18:00 – 20:00	Dinner at Rootes Restaurant
20:30 – 21:30	The Borden Lecture – Sponsored by Garland Press Cori Bargmann (Rockefeller University, USA) Oxygen sensation and navigation behaviour in *C. elegans*

Thursday 7 April

09:00–12:00 ***Session 1***

mRNA localisation

Ilan Davis (UK)
The mechanism of dynein mediated mRNA transport in *Drosophila*

Robert H. Singer (USA)
From nascent transcript to localized mRNA: the entire path of single mRNA molecules in human and yeast cells

Anne Ephrussi (Germany)
The mechanism of oskar mRNA localization and translational regulation in *Drosophila*

Simon Bullock (UK)
The mechanism and function of apical mRNA localization in *Drosophila* embryos

Regeneration and wound healing

Paul Martin (UK)
Tissue repair and inflammation studies in embryos

Freddy Radtke (Switzerland)
Notch signalling in the skin and wound healing

Elly Tanaka (Germany)
Control of neural progenitor cell fate during spinal cord regeneration in *Ambystoma mexicanum*

Systems biology

Nick Monk (UK)
Transcriptional time delays and pattern formation

Hamid Bolouri (USA)
From DNA sequence to network behaviour: functional properties of genetic regulatory networks

James Sharpe (UK)
Building 4D computer models of vertebrate limb development

Luis Serrano (Germany)
Simulation of gene networks using SmartCell

12:00 – 14:00 Lunch and posters
Lunch time Meeting:'Careers in Biological Sciences', organised by Prof. Michael Whitaker

Thursday 7 April (continued)

14:00 – 17:00 **Session II**

Neural stem cells

Charles ffrench-Constant (UK)
Regulation of neural stem cell behaviour by extra cellular matrix

Magdelena Gotz (Germany)
Glial cells generate neurons: *Pax6* as a master regulator of neurogenesis

Wieland Huttner (Germany)
The cell biology of neurogenesis

Derek van der Kooy (Canada)
Building a brain

Polarised secretion of endocytic organelles

Gillian Griffiths (UK)
Polarised secretion in lymphocytes

Ira Mellman (USA)
Endosomes and epithelial cell polarity

Philippe Chavrier (France)
Polarisation of the exocyst

Suzanne Eaton (Germany)
Secretion of argosomes in *Drosphila*

Development of marine animals

Daniel Chourrout (Norway)
How did tunicates diverge from other chordates: the *Oikopleura* case

Patrick Lemaire (France)
From embryology to functional genomics and bioinformatics: analysis of neural tissue formation in the ascidian *Ciona intestinalis*

Chris Lowe (USA)
Hemichordate body patterning and the evolution of deuterostome nervous systems

Detlev Arendt (Germany)
Phototaxis and photoperiodicity in polychaetes, and the evolution of bilaterian eyes and brains

17:00 – 18:00 **BSCB Hooke Medal lecture**
18:00 – 18:30 **BSCB and BSDB AGMs**
18:00 – 20:00 Dinner – Rootes Restaurant
19:30 – 20:00 BSCB Ambassadors Meeting
20:00 – 22:00 Poster Session – Sponsored Bar

Friday 8 April

09: 00–12:00 ***Session 3***

Neuronal transmitters in health and disease

Giampietro Schiavo (UK)
Axonal retrograde transport pathways in motor neurons

Bruno Goud (France)
Rab proteins and the targeting signaling of molecular motors

Mike Fainzilber (Israel)
Retrograde injury signalling in lesioned nerves

Folma Buss (UK)
Myosin VI: a multifunctional motor

Asymmetric Cell Division

Juergen Knoblich (Austria)
Asymmetric cell division in the *Drosophila* nervous system

Francois Schweisguth (France)
E3 Ubiquitin ligases in the regulation of Notch

Pierre Gönczy (Switzerland)
Mechanisms of asymmetric cell division in *C. elegans* embryos

Magda Zernicka-Goetz (UK)
Asymmetric divisions in the early mouse embryo

Space and time

Kate Storey (UK)
Controlling differentiation onset in the extending body axis

Kim Dale (USA)
Analysis of a new component of the molecular segmentation clock

The Beddington Medal Talk

The EMBO Lecture
Denis Duboule (Switzerland)
Studying colinearity through systematic chromosome engineering

12:00–14:00 Lunch and posters
Lunchtime meeting: 'Women in Biology', organised by Prof. Elizabeth Smythe

Friday 8 April (continued)

14:00–17:00 **Session IV**

Cell biology of behaviour

Stephen Nurrish (UK)
Worms on prozac: serotonin signalling mutants in *C. elegans*

Graeme Davis (USA)
Live imaging and molecular mechanisms of synapse assembly and disassembly

Anne Mudge (UK)
New targets for antidepressant action in bipolar disorder

Mario deBono (UK)
Stress & sociality: neuropeptide signalling in *C. elegans*

Micro RNAs

Steve Cohen (Germany)
Computational identification of *Drosophila* miRNA targets

David Baulcombe (UK)
siRNAs and their role in intercellular signalling and chromatin silencing in *Arabidopsis*

Ronald Plasterk (Netherlands)
RNAi and transposon silencing in *C. elegans*

Ulrike Kutay (Switzerland)
Cell biology of miRNA processing

Epithelial migration

A Martinez Arias (UK)
Cellular polarities during epithelial cell movements in development

Ray Keller (USA)
Mechanisms of polarised cell intercalation

Cornelius Weijer (UK)
Chemotactic cell movement during gastrulation

Antonio Jacinto (Portugal)
Epithelial movements during *Drosophila* dorsal closure

17:00 – 18:00 BSDB Waddington Medal Lecture
19:30 – 20:00 Bar reception
20:00 – 1:00am Conference Dinner and Disco/Salsa

Saturday 9 April

09: 00–12:00 ***Session 5***

Regulation of cell death

Luis Miguel Martins (UK)
The neuroprotective role of the serine protease Omi/HtrA2

Guido Kroemer (France)
Cell death regulation by mitochondria

Xiadong Wang (USA)
Biochemical pathways leading to apoptosis

The CR-UK Lecture
Doug Green (USA)
Mitochondria and apoptosis

Pascal Meier (UK)
IAP-mediated regulation of cell death

Mitosis

Jordan Raff (UK)
The role of pericentrin in recruiting proteins to the centrosome

Tony Hyman (Germany)
Regulating microtubule dynamics during mitosis

Cayetano Gonzalez (Spain)
Spindle assembly without centrosomes

Yixian Zheng (USA)
Ran regulation of mitotic spindle assembly

Guidance Systems

Guy Tear (UK)
Guidance mechanisms in development

Darren Gilmour (Germany)
Dynamic cell–cell interactions regulate migration behaviour during zebrafish sensory nervous development

Eres Raz (Germany)
Germ cell migration in zebrafish

Ruth Lehmann (USA)

12:00 – 13:00 **BSDB Plenary Lecture**
Matt Scott (Stanford University, USA)
Hedgehog signalling in development and disease

13:00 – 14:00 Lunch
End of conference

Other forthcoming meetings

2005

Establishing, optimising and producing microarrays
14 January, Birkbeck College, London
www.euroscicon.com

Signalling pathways in acute oxygen sensing
28th January, London
www.novartisfound.org.uk

Improvements in laser capture micro-dissection & downstream applications
11 February, Birkbeck College, London
www.euroscicon.com

Recent advances in apoptosis analysis
18 February, Birkbeck College, London
www.euroscicon.com

Targeted technologies to detect signalling pathways
4 March, Birkbeck College, London
www.euroscicon.com

Epithelial anion transport in health and disease
4 March, London
www.novartisfound.org.uk

RNA-mediated interference in practice
8 April, Birkbeck College, London
www.euroscicon.com

Improving immunohistochemistry
15 April, Birkbeck College, London
www.euroscicon.com

Identifying T cell subset phenotype and function
22 April, Birkbeck College, London
www.euroscicon.com

Heart failure: molecules, mechanisms and therapeutic targets
29 April, London
www.novartisfound.org.uk

Growth, expansion and differentiation of stem cells
13 May, Birkbeck College, London
www.euroscicon.com

Identifying Gene Expression in Mammalian Development
20 May, Birkbeck College, London
www.euroscicon.com

Understanding nicotine and tobacco addiction
20 May, London
www.novartisfound.org.uk

Viral techniques for gene transfer
10 June, Birkbeck College, London
www.euroscicon.com

Purinergic signalling in neuron–glia interactions
10 June, London
www.novartisfound.org.uk

30th FEBS Congress and 9th IUBMB Conference
2–7 July, Budapest
www.FEBS-IUBMB-2005.com

15th International Society of Developmental Biologists Congress
3–7 September, Sydney
www.isdb2005.com

Major steps in cell evolution: evidence, timing and global impact
26–27 September, Royal Society, London
www.royalsoc.ac.uk/events

2006

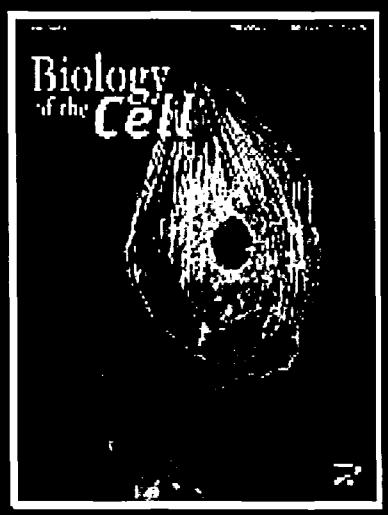
BSCB/BSDB Joint Spring Meeting
(Mon 20) Tues 21 – Thurs 23 March 2006, University of York

2007

16th International Congress of Cytology
13–17 May, Vancouver, BC, Canada
www.venuewest.com

Biology of the Cell

Editor-in-Chief: H. Beverley Osborne



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On behalf of the Société de Biologie Cellulaire de France and the Société Française des Microscopies

Image courtesy of Jan Ellenberg, EMBL, Heidelberg

The British Society for Cell Biology
Financial Statements for the year ended 31 December 2003

Officers and advisors

Executive Committee Members
- Dr. F. Watt (President)
- Prof. M. Whitaker (Secretary)
- Prof. M. Marsh (Treasurer)
- Dr. K. Hodivala-Dilke (Meetings Secretary)
- Dr. J. Pines (Membership Secretary)
- Dr. J. Marsh (Newsletter Editor)
- Dr. A. Ng (Website Co-ordinator)
- Dr. K. Ayscough (Travel Awards Secretary)
- Dr. V. Braga
- Dr. W. Earnshaw
- Dr. G. Griffiths
- Dr. M. Heck
- Prof. A. Lamond
- Dr. P. Luzio
- Dr. S. Nurrish
- Dr. R. Quinlan
- Dr. J. Raff
- Dr. L. Smythe
- Dr. D. Stephens
- Dr. M. Way

Bankers:
- HSBC Bank plc, Arlington Business Centre, Millshaw Park Lane, Leeds LS11 0PA
- National Savings, Glasgow, G58 1SB

Auditors
- Jacob Cavenagh & Skeet
- Acorn House
- 2 Greenhill Crescent
- Watford
- Herts WD18 8AH

Contact Address
- c/o Margaret Clements
- Department of Zoology
- Downing Street
- Cambridge CB2 3DY.

Executive Committee's report for the year ended 31 December 2003

The Executive Committee (who are the trustees of the Society for the purposes of charity law) have pleasure in presenting their report and the audited accounts of the Society for the year ended 31 December 2003. These accounts have been prepared in accordance with the Charities Act 1993, the Statement of Recommended Practice 'Accounting & Reporting by Charities' (SORP 2000); and the constitution of the Society.

Officers and committee

Under the constitution of the Society the Officers of the Society are a President, a Secretary, a Treasurer, a Meetings Convenor, a Membership Secretary, a Newsletter Editor and a Website Co-ordinator. There is also an Executive Committee of the Society consisting of the Officers and twelve other elected members.

The Executive Committee is elected at the Annual General Meeting, with the Officers being elected by the Executive Committee and the President being nominated by the Executive Committee.

The Executive Committee prepares the Agenda for meetings of the Society, and between meetings acts as necessary on behalf of the Society; reporting on any such actions to the next meeting of the Society.

The individuals who served as officers and executive committee members during the year, and since the year-end, were as follows:
- Dr K. Ayscough
- Dr V Braga (appointed 1/4/04)
- Dr L Cramer (resigned 9/4/03)
- Dr W Earnshaw
- Dr G Griffiths
- Dr M Heck (appointed 1/4/04)
- Dr. K. Hodivala-Dilke (appointed 9/4/03)
- Dr S Hughes (resigned 9/4/03)
- Prof. A. Lamond
- Dr P Luzio
- Dr J Marsh
- Prof M Marsh
- Dr I Nathke (resigned 9/4/03)
- Dr. A. Ng (appointed 9/4/03)
- Dr. S. Nurrish
- Dr J Pines
- Dr R Quinlan
- Dr J Raff
- Dr L Smythe (appointed 1/4/04)
- Dr D Stephens (appointed 1/4/04)
- Dr C. Streuli (resigned 9/4/03)
- Dr M Way
- Dr F Watt
- Prof M J Whitaker
- Dr S Winder (resigned 9/4/03)

The executive committee members in office at date of report are detailed above.

Status & constitution

The Society is constituted under a constitution executed in 1965, and amended in 2002. The Society is a registered charity, number 265816.

Objects

The objects of the Society are to promote the advance of research in relation to all branches of cell biology and to encourage the interchange of information. The Society generally aims to fulfil these objects by organising and sponsoring two meetings each year on topics relevant to cell biology; issuing a twice yearly newsletter; and maintaining a website (www.bscb.org).

Review of Activities

In April the Society held a successful spring meeting at the University of Warwick (jointly with the British Society for Developmental Biology [BSDB]). The theme for the meeting was "Genomics and Proteomics in Cell Biology'. A total of almost 500 delegates attended the meeting.

In September the Society held its annual autumn meeting jointly with the British Association for Cancer Research in Oxford. The focus for this meeting was Cell Biology of Cancer.

The Honor Fell Travel Award scheme allowed 65 graduate student and postdoctoral members of the society to attend national and international meetings. Three additional awards allowed undergraduate students to attend the joint spring meeting.

Further details of reports of the Society's meetings throughout the year are to be found in the biannual newsletter, available on the Society's website.

The financial results of the Society are set out on page 33.

Reserves

The Executive Committee regularly reviews the reserves of the charity to ensure that sufficient liquid funds are available for the Society to meet its ongoing obligations. The reserves throughout the period have been adequate to fulfil this objective.

Investment Policy

The Executive Committees' policy at present is to invest in low-risk and reasonably liquid assets, so that funds are available to meet any unforeseen needs that arise as a consequence of meeting activities.

Risk assessment
The major risks to which the Society is exposed, as identified by the Executive Committee, have been reviewed in the year and systems are in place to mitigate those.

Executive Committee's Responsibilities
Charity law requires the Executive Committee to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the Society and of the surplus or deficit for that period. In preparing those financial statements, the Executive Committee have:

- selected suitable accounting policies and then applied them consistently;
- made judgements and estimates that are reasonable and prudent;
- prepared the financial statements on the going concern basis unless it is inappropriate to assume that the Charity will continue in existence.

The Executive Committee has overall responsibility for ensuring that the Society has an appropriate system of controls, financial and otherwise. It is also responsible for keeping proper accounting records which disclose with reasonable accuracy at any time the financial position of the Society. It is also responsible for safeguarding the assets of the Society and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Governance and internal control
The Executive Committee is also responsible for implementing systems of internal control which provides reasonable assurance that:

- the Society is operating efficiently and effectively;
- its assets are safeguarded against unauthorised use or disposition;
- proper records are maintained and financial information used within the charity or for publication is reliable;
- the Society complies with relevant laws and regulations.

The systems of internal control are designed to provide reasonable, but not absolute, assurance against material misstatement or loss. They include:

- delegation of authority and segregation of duties;
- identification and management of risks.

Report of the Independent Auditors to the Executive Committee of The British Society For Cell Biology
We have audited the financial statements of The British Society for Cell Biology for the year ended 31 December 2003 which comprise of the Statement of Financial Activities, the Balance Sheet and the related notes. These financial statements have been prepared under the historical cost convention and the accounting policies set out therein.

This report is made solely to the Society's Executive Committee, as a body, in accordance with section 44 of the Charities Act 1993. Our audit work has been undertaken so that we might state to the Executive Committee those matters we are required to state to it in an auditors' report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Society and the Society's Executive Committee as a body, for our audit work, for this report, or for the opinions we have formed.

Respective responsibilities of Executive Committee and auditors
The Executive Committee (who are the trustees of the Society for the purposes of charity law) are responsible for preparing the Executive Committee's Report and the financial statements in accordance with applicable law and United Kingdom Accounting Standards as set out in the Statement of Executive Committee's Responsibilities above.

We have been appointed auditors under section 43 of the Charities Act 1993 and report in accordance with regulations made under section 44 of that Act. Our responsibility is to audit the financial statements in accordance with relevant legal and regulatory requirements and United Kingdom Auditing Standards.

We report to you our opinion as to whether the financial statements give a true and fair view and are properly prepared in accordance with the Charities Act 1993. We also report to you if, in our opinion, the Executive Committee's Report is not consistent with the financial statements, if the Society has not kept proper accounting records, or if we have not received all the information and explanations we require for our audit.

We read other information contained in the Executive Committee's Report, and consider whether it is consistent with the audited financial statements. We consider the implications for our report if we become aware of any apparent misstatements or material inconsistencies with the financial statements. Our responsibilities do not extend to any other information.

Basis of opinion
We conducted our audit in accordance with United Kingdom Auditing Standards issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgements made by the Executive Committee in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Society's circumstances, consistently applied and adequately disclosed.

We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or other irregularity or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the financial statements.

Opinion
In our opinion the financial statements give a true and fair view of the state of the Society's affairs as at 31 December 2003 and of its incoming resources and application of resources in the year then ended and have been properly prepared in accordance with the Charities Act 1993.

Jacob Cavenagh & Skeet
Chartered Accountants
and Registered Auditor
Acorn House
2 Greenhill Crescent
Watford
Herts WD18 8AH

Statement of financial activities for the year to 31 December 2003

	2003			2002
	Unrestricted	*Restricted*	*Total*	*Total*
	£	£	£	£
Incoming resources				
Donations, legacies & similar incoming resources	7,996	33,208	41,204	50,642
Activities in furtherance of the charities objects				
Meetings	104,456	–	104,456	276,759
Subscriptions	23,573	–	23,573	24,486
Mailing list		–		428
Adverts and fliers	–	–	–	5003
Investment income	3,945	–	3,945	3652
Total incoming resources	141,970	33,208	175,178	355,967
Resources expended				
Cost of generating funds				
Publicity & Sponsorship costs	–	–	–	11,882
Charitable expenditure				
Grants payable in furtherance of the charity's objects				
Honor Fell travel awards[2]	6,612	20,000	26,612	21,280
Costs of activities in furtherance of the charity's objects				
Costs of meetings	100,231	13,208	113,439	276,289
Newsletter costs	5,411	–	5,411	7,407
Website expenses	1,583	–		1,583
Management and administration[5]	7,165	–	7,165	11,485
Total resources expended	120,389	33,208	153,597	329,926
Net movement in funds for the year	21,581		21,581	26,041
Funds brought forward at 1 January	161,363	-	161,363	135,322
Funds carried forward at 31 December	182,944	-	182,944	161,363

Balance sheet as at 31 December 2003

		2003		2002
	£	£	£	£
Current assets				
Debtors:				
Other debtors		3,248		450
Prepayments and accrued income		8,307		7,735
Cash at bank and in hand:				
National Savings Investment Account		58,495		56,702
HSBC Bank Accounts		119,069		115,191
		189,119		180,078
Less: Creditors falling due within one year				
Income received in advance			3,920	
Creditors and accruals	6,175		14,795	
		6,175		18,715
Net Assets		182,944		161,363
Funds				
Unrestricted funds		182,944		161,363
		182,944		161,363

Notes to the accounts for the year ended 31 December 2003

1. Accounting Policies

a) Basis of accounting

The financial statements are prepared under the historical cost convention and in accordance with applicable Accounting Standards; the Statement of Recommended Practice 'Accounting and Reporting by Charities' (issued October 2000) and the Charities Act 1993.

The Society has taken advantage of the exemption in Financial Reporting Standard 1 from producing a cash flow statement, on the grounds that it would have been a small company had it been a company incorporated under companies' legislation.

b) Funds

General unrestricted funds represent the funds of the Society that are not subject to any restrictions regarding their use and are available for application on the general purposes of the Society.

Restricted funds are those subject to specific trusts, which may be declared by the donor or with their authority. The restricted funds of the Society are restricted income funds given for specific purposes which are expendable at the discretion of the Executive Committee in accordance with particular activities of the Society.

c) Incoming Resources

Donations and similar incoming resources are accounted for when receivable. Subscriptions and mailing list sales represent amounts receivable during the year. Meetings income is recognised in the period when the meeting takes place and investment income and bank interest are the amounts receivable for the year.

d) Resources Expended

Expenditure represents purchases and expenses incurred during the year including irrecoverable VAT. All expenditure is recognised on an accruals basis, with advance expenditure for meetings being deferred until the period when the meeting takes place. Transactions in foreign currency are translated at the rate ruling on the date of the transaction. Balances denominated in foreign currencies are retranslated at the year-end, with the gain or loss on retranslation going through the SOFA for the year. Management and administration comprises all the expenditure incurred in connection with the management and administration of the charity. Grants and awards are accounted for when paid over, or when awarded, if that award creates a binding obligation on the charity.

e) Joint arrangement

The share of income and expenditure from joint arrangements to put on meetings in the year is accounted for under the appropriate heading in the Statement of Financial Activities.

2. Grants made

Honor Fell travel awards represent grants made to members to enable them to travel to meetings of the Society. During the year grants totaling £26,612 were made to 68 individuals, £20,000 of which being funded from the generous grant received from The Company of Biologists Limited, restricted for that purpose. No individual grants or travel awards exceeded £1,000 in the year.

3. Executive Committee members & Employees

No Executive Committee member or any person connected with them received, or is due to receive, any remuneration for the year directly or indirectly from the Society's funds.

Four (2002: eleven) Executive Committee members received a total of £1,364 (2002: £2,406) in respect of reimbursed travel expenses during the year, as shown in note 4. The Society has no employees.

Charity funds were used to purchase trustee indemnity insurance during the year (£798).

4. Joint arrangements

During the year the Society entered into two joint arrangements; with the Society for Developmental Biology (BSDB) for the meeting in Warwick; and with the British Association for Cancer Research (BACR) for the meeting in Oxford.

5. Management and Administration expenses

Management and administration expenses are analysed as follows:

	2002			2001
	Unrestricted	Restricted	Total	Total
	£	£	£	£
Secretarial	700	–	700	700
Executive Committee expenses	2,439	–	2,439	2,406
Subscriptions	509	–	509	3,703
Bank charges	464	–	464	547
Exchange losses	449	–	449	830
Accountancy & Independent Exam	–	–	–	1,645
Auditors' remuneration: Audit	1,250	–	1,250	1,175
Accountancy	1,354	–	1,354	470
Miscellaneous	–	–	–	9
	7,165	–	7,165	11,485

6. Restricted funds

	Balance b/f	Incoming resources	Resources expended	Balance c/f
	£	£	£	£
Honor Fell Fund	–	20,000	20,000	–
Symposium Fund	–	13,208	13,208	–
	–	33,208	33,208	–

The Honor Fell Fund relates to funds granted specifically to enable the making of grants to student delegates to cover the costs of travel to meetings of the Society.
The Symposium Fund relates to funds granted as a specific contribution towards costs of meetings of the Society.

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 younger BSCB members at the beginning of their research careers to attend meetings. They are aimed at PhD students and postdocs. Applications are considered for any meeting relevant to cell biology. The amount of the award depends on the location of the meeting. Awards will be up to £300 for UK meetings (except for BSCB Spring Meeting for which the registration and accommodation costs will be made, even in excess of £300), up to £400 for European meetings and up to £500 for meetings in the rest of the world.

Awards are made throughout the year.

The following rules apply:

- Awards are not normally made to applicants over 35 years of age.
- Normally, no applicant will receive more than one award in each calendar year and three in toto.
- The applicant must be contributing a poster or a talk.

Applications should be sent to:
Jordan Raff, Wellcome/Cancer Research UK Institute, University of Cambridge, Tennis Court Road, Cambridge CB2 1QR.

All applications must contain the following:

- **the completed and signed application form (below)**
- **a copy of the abstract being presented**
- **a copy of the completed meeting registration form**

First-year PhD students should send a copy of their BSCB membership application.

Application for an Honor Fell travel award

Full name and Work address

(write clearly – this will be used as a return label)

.....

.....

.....

.....

.....

E-mail address: .....

Age: .....

BSCB Membership number: .....

The years of previous Honor Fell awards:

.....

Degrees (with dates): .....

.....

Present position: .....

.....

Key publications (2) or research interests:

.....

.....

.....

Number of meetings attended last year:

.....

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

.....

.....

.....

Estimated expenses: Travel: .....

Subsistence: .....

Registration: .....

Have you submitted any other applications for financial support?

YES NO (delete as applicable). If YES, give details including source and whether these monies are known to be forthcoming:

.....

.....

Supporting statement by Head of Department:

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

Signature: .....

Name: .....

Applicant's signature: .....

Name: .....

Undergraduate bursaries to attend the BSCB Spring Meeting

Administered through the Honor Fell Travel Award Scheme
Jointly funded by the BSCB and the Company of Biologists

Undergraduate Bursaries are made to provide financial support for undergraduates currently studying cell biology or a related degree subject to attend the BSCB Spring Meeting. The award will cover the registration and accommodation costs of attendance. Travel costs are expected to be met by the University that the undergraduate attends.

The following rules apply:

- Awards are made to undergraduates in their final year of study.
- Applicants must be studying for a Cell Biology or related degree.
- Applications must be accompanied by a half page justification from the student **and** by a supporting statement from the supervisor of studies or course organiser.

Applications should be sent to: Jordan Raff, Wellcome/Cancer Research UK Institute, University of Cambridge, Tennis Court Road, Cambridge CB2 1QR.

All applications must contain:

- **the completed and signed application form (below)**
- **statements from both the student and course organiser.**

- The statement from the student should include details on why they wish to attend, what they hope to gain and also aspects of cell biology that to date they have found interesting.
- The statement from the course co-ordinator should indicate the course being undertaken by the student and reflect the calibre of the student, their enthusiasm for the subject and why they believe the student will benefit from the experience of attending the meeting.

Application for an undergraduate Honor Fell travel award

Full name and Work address
(write clearly – this will be used as a return label)

.....
.....
.....
.....
.....

E-mail address: .....
Age: .....
Institution attended: .....
Degree course: .....
.....

Main cell biological interests: .....
.....

Supporting statement by Head of Department or Course Co-ordinator: This applicant requires these funds and is worthy of support. The University/Department also agrees to pay the travel costs for the named undergraduate to attend the meeting.

Signature: .....
Name: .....

Applicant's
signature: .....
Name: .....

DEADLINE FOR APPLICATIONS: 31 January 2005

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 a searchable database of its members on the BSCB web page. This list is not sold or distributed in any other way. Your details will be included only if you tick this box ☐

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

British Society for Cell Biology

DIRECT Debit

Please complete parts 1, 2, 3, 4 and 6 to instruct your branch to make payments directly from your account. Then return the form to: British Society for Cell Biology, c/o Margaret Clements, Department of Zoology, Downing Street, Cambridge, CB2 3EJ.

To The Manager, Bank/Building Society

.....

Address

.....

.....

..... Postcode .....

Originator's identification number | 9 | 4 | 1 | 4 | 5 | 1 |

FOR BSCB USE ONLY
This is not part of the instruction to your bank/building society

5. Originator's reference number (for office use only) **BRITSO** | | | | |

1. Please write the full postal address of your branch in the box above.

2. Name of account holder

.....

3. Account number | | | | | | | | |

4. Sort code | | | — | | | — | | |

Banks/Building Societies may refuse to accept instructions to pay direct debits from some types of account.

6. Instructions to the Bank or Building Society

Please pay the British Society for Cell Biology Direct Debits from the account detailed on this Instruction subject to the safeguards assured by the Direct Debit Guarantee.

Signature .....

Date .....

This guarantee should be detached and retained by the payee

The Direct Debit guarantee

- This guarantee is offered by all Banks and Building Societies that take part in the Direct Debit scheme. The efficiency and security of the scheme is monitored and protected by your own Bank or Building Society.
- If the amounts to be paid or the payment dates change, the BSCB will notify at least 14 days in advance of your account being debited or as otherwise agreed.
- If an error is made by the BSCB or by your Bank/Building Society, you are guaranteed a full and immediate refund from your branch of the amount paid.
- You can cancel a Direct Debit at any time, by writing to your Bank or Building Society. Please also send a copy of the letter to the BSCB.

British Society for Cell Biology
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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.

Subscription information
Paying by direct debit:
Regular member £25
Student, school teacher, retired member £10
UK resident members NOT paying by direct debit:
Regular member £35
Student, school teacher, retired member £15
Overseas members paying by bankers draft:
Regular member £25
Student, school teacher, retired member £10

If you are still paying by standing order, please cancel it and set-up direct debit. Those members who do not have a UK bank account should pay by bankers draft in pounds sterling payable to 'the British Society for Cell Biology'.

New members should complete an application form to join the BSCB (form on p28) and include it with their subscription dues. Send direct debit forms, bankers drafts and any membership application forms to Margaret Clements, Department of Zoology, Downing Street, Cambridge, CB2 3EJ.

Postmaster and General Inquiries
Send changes of address, amendments, and general queries to:
Margaret Clements, BSCB assistant, Department of Zoology, Cambridge University, Downing Street, Cambridge CB2 3EJ.
Tel: +44 (0)1223 336655 Fax: +44 (0)1223 353980,
E-mail: BSCB@zoo.cam.ac.uk
Invoices: send to: Professor Mark Marsh, Cell Biology Unit, MRC Laboratory for Molecular Cell Biology, University College London, Gower Street, London WC1E 6BT.

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

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

Supply either on a zip disk or CD for Macintosh (Quark version 4, Quark version 3.32, JPG, TIF or PSD) with margins: top 26mm, left/right/bottom 20mm. Page size 218x280mm. Alternatively, supply film: single/four colour positive, right reading, emulsion down, screen 133x150.

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, e-mail: BSCB@zoo.cam.ac.uk

Journals
BSCB members are entitled to a 25% discount from the individual subscription rate to all journals published by the **Company of Biologists**, and other discounts from other publishers. To take advantage of this offer, quote your BSCB membership number when ordering your subscription.

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

The following journals from **John Wiley & Sons** have discounts of 25–65% (*https://secure.interscience.wiley.com/order_forms/bscb.html*)

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

* No standard individual rate available; only available to institutions

NB: The price for the *Journal of Morphology* is now $175. If there are any members who have ordered the journal at the $150 rate, those orders will be honored.

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

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