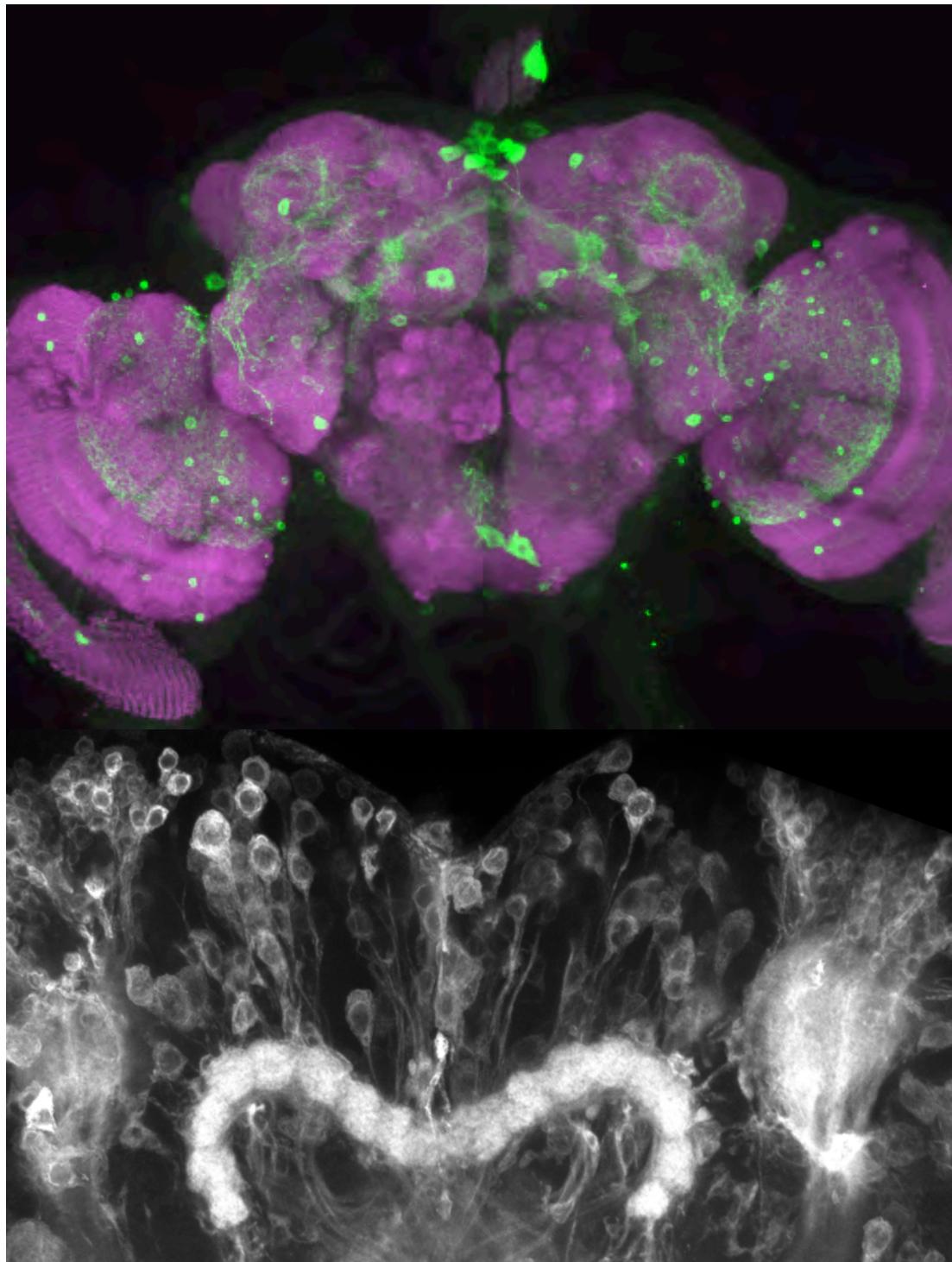


BSDB Newsletter

British Society for Developmental Biology

www.bsdb.org



Summer 2009
Vol. 30, No. 1

**Debating the
Nature of Life**

**A new Chair for
the BSDB**

Also in this issue:

- Biosciences Federation merges with IoB

An orchestra of instruments far beyond 3D

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We make it visible.

Editorial

We're in the middle of an uncharacteristic heatwave here in Edinburgh as I rush to get this newsletter finalised. Let's hope the weather is also good in September when Edinburgh hosts the ISDB conference – particularly for the first night, 6 September. Why so? Because this night will be marked by a large and spectacular fireworks display that can be seen from the many hills for which the city is famous. I'm sure the organisers would like you to think that the display was organised for ISDB's benefit, but actually the conference is cunningly timed to begin the same day the Edinburgh International Festival ends. Hence the fireworks.

Wider education issues are something the BSDB would like to promote more. In this issue we have an interesting article by a high school science teacher, David

Martindill. It describes a debate between Lewis Wolpert and Martin Sheldrake (the latter well known for highly controversial theories), and his pupils' subsequent discussion of the debate. I think the article provides an interesting perspective on the difficulties of teaching science at school – particularly the issue of how to educate pupils to evaluate ideas that are very unequal in their experimental support.

Finally, as Matthew Freeman relinquishes his role as BSDB Chair, I'm sure all committee members will join me in thanking Matthew Freeman for the outstanding job he has performed. Over his term of office he has brought energy and purpose to the Society in a way that many members probably haven't fully appreciated. He will be missed.

Andrew Jarman, Editor

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Help us spread the word

Please print out a copy of this newsletter and leave it in a strategic place, such as your coffee room or staff room.

Cover image.

*The Drosophila brain.
Courtesy of Dr Jo Young,
School of Informatics,
University of Edinburgh*

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From the Chairman



It is sobering to realise that almost five years have passed since I took over as BSDB Chairman and that this is therefore my last Chairman's letter. Re-reading my first, I set out two broad goals. The first was to maintain the excellence of BSDB meetings, so that they remained an essential date on the calendars of developmental biologists in the UK and abroad. This has certainly been achieved, although honesty compels me to admit it has rather little to do with the Chairman and much more to do with the teams than run the meetings: the scientific organisers, the professional conference managers and, most of all, the BSDB Meetings Secretary.

Nevertheless, I am proud to have been involved with a truly outstanding run of meetings – large and general in the spring; smaller, focused, and occasionally abroad in the autumn – with common threads of scientific excellence, good value and friendliness. Combined with the quality of the speakers who attend, an important illustration of their success is that many of today's leaders cut their scientific teeth at BSDB meetings, and all the signs indicate that future stars still see them as a great launchpad.

The success of my second initial goal is harder to evaluate. It was to ensure that policy issues that affect the developmental biology community were well represented by the Biosciences Federation. This rather indirect goal recognised that a small and scientifically focused society like the BSDB was unlikely to influence policymakers effectively, and that a larger federation of bioscience societies was a more sensible approach. This remains true, but we

are now in a state of transition since the BSF recently decided to merge with the Institute of Biology. There is an unquestionable need for an intelligent and effective voice to represent bioscientists to policymakers at a time when our science is so often the focus of public attention and at the heart of advances that could have major social implications. The BSDB will monitor the outcome of the merger closely to see whether this new body provides what's needed.

My five year term has coincided precisely with the planning of the ISDB Congress, that you will all know is being hosted by the BSDB in Edinburgh this September (and which, exceptionally, replaces both regular BSDB meetings this year). All the signs are looking good: the meeting should be a great success, and I am particularly excited by the quality of the national and international speakers that have agreed to attend. The early registration deadline in 1 June, so if you haven't already, sign up soon to come to a full-scale international congress, locally.

I cannot sign-off without thanking a number of people for all they have done to make the last five years so enjoyable for me. The whole BSDB committee is hard-working and dedicated, and everyone on it deserves our real thanks.

Nevertheless, I hope I will be forgiven for singling out just a small number; these are the people without whom very little would have happened in the last five years. **Guy Tear** has been Treasurer for the whole time I have been Chairman and he has

"There is an unquestionable need for an intelligent and effective voice to represent bioscientists to policymakers at a time when our science is so often the focus of public attention and at the heart of advances that could have major social implications"



Chairman's letter continued...

done this demanding job not only with financial acumen but also with a graceful light touch that has made it a real pleasure to work with him.

Robert Kelsh and more recently **Mike Taylor** have been superb Secretaries, both of them ensuring that the business of the society, and its membership activities, is conducted properly and efficiently. And finally the Meetings Secretaries, **Nancy Papalopulu** and now **James Briscoe**, are the people who take primary responsibility for organising the conferences – the *raison d'être* of the society. Without their continuous dedication, attention to detail and sheer hard work, none of the meetings would take place. I know I speak for our entire

membership when I say thank you to all; but I also thank them personally for having been such great colleagues.

My final job is to hand over the reins to my successor. This will formally occur in October but I am pleased to announce that Liz Robertson has been elected by the committee to take over. It has been a great honour for me to serve as Chairman for these last years, and it is a great pleasure to leave the BSDB in the hands of such an outstanding developmental biologist.

Matthew Freeman

Do your contact details need updating?

As always, it's a hard job keeping the database of the Society membership up to date. If you change your address, please remember to send us the details. You can use a new online feedback form to give us this information.

<http://www.bms.ed.ac.uk/services/webspace/bsdb/Bsdbfeedbackform3.htm>

Have your say

If you have news, letters, or comments you would like aired to the developmental biology community, please write to the Editor

(andrew.jarman@ed.ac.uk)



Funding for Small Meetings from CoB

BSDB members may not be aware that The Company of Biologists provides funding for small meetings in developmental biology. The BSDB does not generally provide such funding, so members should apply to the Company of Biologists if interested. From their website:

"The Company of Biologists will consider direct applications for a grant towards the cost of running a

small meeting within the fields of the Company's journals. Such a meeting would normally be a local one on a small budget. Applications for support for aspects of large meetings will not be considered for a small meeting grant; such applications should be directed to the Company's Grants Committee."

http://www.biologists.com/cob_grants.html

Liz Robertson to be new Chair of BSDB

It is our pleasure to report that Liz Robertson has agreed to take on the important job of BSDB Chair.

Liz is a Wellcome Trust Principal Research Fellow and Professor of Developmental Biology in the William

Dunn School of Pathology, University of Oxford. Her research interests include BMPs and germ layer specification in early mouse development.



Financial report

"the Company of Biologists generously increased the funding they provide to support members to travel to meetings or courses overseas to £27,500."

Are you paying your fair share?
We still have a 'hard core' of members who are paying less than they should. Please check your standing order today and update if necessary!

I am pleased to report that the Society continues to be in good financial health. We ended our financial year on 31 July 2008 showing a slight surplus sufficient to maintain our assets at an appropriate level. We had two very successful meetings during the financial year at Sheffield and Warwick. The BSDB makes a contribution to the running costs of all our meetings to reduce the registration fees as much as possible. We then aim for our meetings to run to budget and break even, hoping not to make a profit from your registration fees and not to make a loss for the Society to bear. This year we hit our targets with the Autumn meeting showing a slight profit which was balanced by the Warwick meeting posting a loss of a very similar small amount.

As I reported last Spring, the Company of Biologists generously increased the funding they provide to support members to travel to meetings or courses overseas to £27,500. In recognition of their support these travel grants will be renamed the Company of Biologists Travel Awards. This year we made awards to 101

members to attend meetings or courses outside the UK. We were also able to fund all the applications we received for Travel Grants to attend BSDB meetings. Over 2008 we awarded £32,716 to 104 members to attend BSDB meetings.

ISDB 2009 finances

This year is going to be an exceptional year for the BSDB as we will be hosting the ISDB congress. This is a huge financial commitment for the Society and your Treasurer is already losing sleep over it. The meeting will replace our traditional Spring and Autumn meetings and will have an excellent programme of speakers. We have worked hard to make the meeting as affordable as possible but its sheer size will make the meeting more expensive than our traditional meetings. The BSDB is making a significant contribution to the meeting and has set aside funds for Travel Grants for BSDB members. I hope as many of our members as possible take the opportunity to attend the congress, which will be the premier developmental biology meeting of 2009.

Guy Tear



Louie Hamilton Fund
There is a small amount of money available from the Louie Hamilton Fund to provide travel support for handicapped members. Applicants should contact the

Payment option for overseas members

It is possible to pay your subscription by PayPal. This facility is primarily aimed at our overseas members and we do not encourage other members to use this route as it causes us certain problems when it comes to renewal of subscriptions. For those who need to use it, the process is fairly painless and full instructions can be found on our webpage.

<http://www.bms.ed.ac.uk/services/webspace/bsdb/BSDBpaypal.htm>



Travel grants (Company of Biologists Travel Awards)

BSDB Spring and Autumn meetings

These are the only UK meetings for which there is BSDB support, grants cover cost of registration (but not conference dinners) and basic travel if funds permit. Generally we are receiving more applications than we can fund in full and preference is given to student members who present posters. BSDB members based abroad are eligible for a contribution (max. £400) to attend our meetings. All applications for travel grants to attend BSDB meetings must be in the hands of the Treasurer by the published deadline.

Overseas meetings

There is considerable demand for funds to travel to meetings overseas. As this year's major meeting in the field of developmental biology will be in the UK we anticipate that demand for these awards will be less than in previous years. Applications are collected each month and a decision on awards made at the end of the month with funds awarded according to the remaining budget. To allow us to fund as many applicants as possible we are currently limiting awards to a maximum of £400. Preference is given to members presenting work at the meetings.

I process the applications as rapidly as I can but it can be 6–8 weeks after you submit an application before you are notified of your award. Please note that I do not make funds

available to attend meetings that have already taken place when I come to consider the applications. Please bear this in mind and submit your application at least two months before the start date of the meeting.

Practical courses

The BSDB will also provide funds up to a maximum of £500 for members to attend courses or to visit laboratories overseas. These applications are considered alongside those for overseas meetings.

Applying for a travel grant

Members should complete a Travel Grant Application form and send it to the Treasurer. Forms can be downloaded from the BSDB website: www.bsdb.org.

Applications for overseas meetings are advised to be submitted 3–4 months in advance so that the BSDB contribution can be used as a lever to prise the rest of the money from other sources. Grants will NOT be awarded in arrears.

Please note: Nobody will be awarded more than one travel grant per year for an overseas trip. No more than two people from one department or one person from a group will be awarded a grant to a particular meeting. Also, due to our charitable status, the purpose of any award must be clearly identifiable as Developmental Biology

The deadline for Travel Grants to ISDB2009 has passed

Warning!

Only members paying the correct subscription to the Society will be eligible for a Travel Grant

Subscription information

Full members	£35 per annum
Student members	£15 per annum

Student members that joined the Society in 2004 are reminded that they should upgrade their subscription to the full member rate of £35.



The Graduate Students' Section

It's the final furlong in my pursuit of a doctorate, so I write this under a blizzard of papers, lists of unfinished experiments and half-finished figures whilst being chased by those two dreaded, but polite enquiries: "How's the writing going?" and "So where are you going next?". Thankfully I managed to escape the mid-PhD black hole, the period where any and all experiments refuse to work for no reason other than to test the limits of your nerves, and have something to put in my thesis!

Developing biologists

Unfortunately, my period as graduate representative will be coming to an end this year. I took over from Raphie Kitson-Pantano in 2007 keen to carry on her good work and I hope I have succeeded, at least in part. I've always tried to help my fellow graduates (and myself!) get opportunities to present their work or to get important and salient information about careers, locally in Cambridge and nationally through BSDB. The BSDB is an excellent platform for graduates – is there any other professional society in the world that gives its junior members such recognition? It has been a great privilege to work with a committee of outstanding scientists who care about the advancement of developmental biology in the UK and who pay particular attention to nurturing those of us who are only just beginning to find our place in science. I hope to hear from lots of

you who are interested in taking over the really rewarding post of graduate representative – this is a role with which you can make a real impact.

ISDB 2009

My last organisational adventure comes at ISDB 2009 in Edinburgh where I hope to meet many more of you! This conference is an excellent chance to show off some of the great research graduate students are pursuing around the world and I hope to do that in a 2 hour session open to all to attend, but dedicated to student speakers. The talks for this session will be picked from abstracts submitted by grads for oral presentation by the chairs of each of the main sessions of the meeting. Hopefully we'll have a great mix of topics and presenters from around the world.

In addition to our academic activities, I'm hoping to arrange some social gatherings in and around Edinburgh. It would be great to hear from any current grads in Edinburgh about the best local student hangouts and places we could get together to sample the local nightlife. I'm looking forward to your suggestions!

As always, you can contact me by e-mail (gp3@sanger.ac.uk) or through Facebook. I'm looking forward to your queries about becoming that graduate representative and your advice about Edinburgh's social scene!

Gareth Powell
gp3@sanger.ac.uk

BSDBook
Visit the 'BSDB graduate student group' at Facebook.com to keep up to date about student events for ISDB2009

Get in touch and get involved!

I'm happy to consider anything for the newsletter: articles, short tips, etc. If you wish to remain anonymous let me know but in all cases could you please give me your name, the name of your institution and your year of study

YOUR NAME HERE...

Would you like to be the next student rep on the BSDB committee?

It's an interesting insight into the running of a learned organisation, and it's great for your CV!

Please contact me if you're interested or if you just want to know more.



Biology Organisations agree to Unification

Press release from the Biosciences Federation

Members of the UK's two leading biology organisations, the Institute of Biology (IoB) and the Biosciences Federation (BSF), have voted overwhelmingly in favour of unification to form a single organisation, the **Society of Biology**. This positive development takes the IoB and BSF a step closer to the creation of an organisation that combines the expertise of the learned societies and other biology organisations with the professional skills of the IoB and its individual members.

The Government's Chief Scientific Adviser, Professor John Beddington, said, "I am delighted to hear this news. The Life Sciences have suffered in the past through fragmentation. The future health and wealth of this nation will depend increasingly on progress made in the biological sciences, and it is excellent that the scientists involved are now all pulling together."

The move towards creation of the Society of Biology coincides with Lord Drayson's establishment of a team, within the Department for Innovation, Universities and Skills, which will carefully monitor the UK's standing in biotechnology and its applications. Professor Dame Nancy Rothwell, Chair of the Interim Council of the Society of Biology, said, "The vote of the membership demonstrates significant confidence in the work undertaken by many during the past few years to bring about this unification. The Society of Biology will have a sufficient critical mass to enable it to speak with authority over the breadth of topics covered by modern biology, and we look forward to working closely with Lord Drayson's team."

Professor Martin J Humphries, Chair of the Biochemical Society, said, "I welcome this decision because it will facilitate greater cooperation between the learned societies that represent UK Biology. The resultant synergies from these interactions will improve the ways in which learned societies represent their members, whether they are based in the UK or elsewhere in the world."

A clear majority of IoB members voted in favour of the move at the Institute's 60th Annual General Meeting, held yesterday - April 22nd. Professor Raymond Dwek, who will be the last President of the IoB, said how pleased he was that the members had put the best interests of their science first. "The Institute's proud and productive 60 year history will make a valuable contribution to the development of the new body in the years ahead." Member Organisations of the Biosciences Federation voted without objection at their Annual General Meeting, held on the 15th April.

The forthcoming integration of the Institute of Biology and the Biosciences Federation offers a unique opportunity to create the leading organisation for biology in the UK. For more information, see: www.newbio.info.

The Institute of Biology (IoB) is an independent and charitable body charged by Royal Charter to represent UK biologists and biology. It has around 12,000 individual members and over 50 specialist learned societies "affiliated" to it.

<http://www.iob.org>



International Society for Developmental Biology Congress 2009

For details and updates, visit:
<http://www.in-conference.org.uk/ISDB2009/>
Or contact:
isdb@in-conference.org.uk"

Edinburgh International Conference Centre, Edinburgh 6–10 September 2009

As of publication of this newsletter, the ISDB meeting is more or less fully subscribed and promises to be an excellent meeting

Programme includes:

- Stem Cells and Medicine
- Stem Cells and Pluripotency Regeneration
- Non-coding RNA in Development
- Mechanisms of Morphogenesis
- Morphogenesis and Birth Defects
- Organogenesis
- Growth Control and Tumours
- Advances in Imaging Technologies

- Cilia in Development and Disease
- Asymmetry in Cells
- Asymmetry in Organisms
- Darwin and Development 2009
- Early Neural Development
- Behaviour and Neural Circuits
- Cell Migration
- Signalling in Development
- Modelling and Networks
- Chromatin and Epigenetics
- Late Breaking News



Debating the Nature of Life

It's astonishing," a friend of mine at university once said, "that just one human being is born perfectly formed." I agreed. For an undergraduate nearing graduation nothing was more seducing than the challenge of investigating the mysteries of morphogenesis. One Ph.D. in developmental biology later and I find myself in a profession attempting to introduce a new generation of eager minds to this fascinating subject.

It is a well-established fact that extra-curricular events have a significant role to play in inspiring pupils' interest in the further study of science. However, it is rare for them to have the opportunity to witness and contribute to a scientific debate as superb as that offered as one of the highlights of this year's Cambridge Science Festival. The event in question, *The Nature of Life – a Scientific Debate*, pitted Professor Lewis Wolpert, the distinguished developmental biologist, against Doctor Rupert Sheldrake, a proponent of several controversial theories. The session promised to be a continuation of a celebrated debate between the pair at London's Royal Society of Arts five years ago. The event had been broadcasted widely and our group of year ten pupils was fortunate to obtain seats in the packed lecture theatre.

Lewis' Legacy

It is not birth, marriage, or death, but gastrulation which is truly the most important time in your life. (Lewis Wolpert, 1986)

Professor Lewis Wolpert is Emeritus Professor of Biology as applied to Medicine at University College, London. He is, of course, well known

for investigating morphogens and their role in giving cells positional information during embryogenesis. He is celebrated both for conceiving the French Flag Model in the 1960s and for his later work on the process of gastrulation. Professor Wolpert also enjoys his status as a public broadcaster of science. He recently signed a letter to the Prime Minister deplored the teaching of creationism in schools and, with similar fervour, maintains his assertion that Britain should be granted a public holiday on Charles Darwin's birthday. It is this provocative frankness and that typified his lecture, which opened the event.

David Martindill

Science teacher,
Westcliff High School
for Boys, Essex



"You may find his work contentious," the Chair warned as Dr Sheldrake took the stage.'

"Genes are telephone numbers – they are important, but boring"

"I shall not be showing any images during this talk," said Professor Wolpert unashamedly, "because there are no pictures in my new book, *How We Live and Why We Die: The Secret Lives of Cells*." "It struck me," he continued, "that many of my non-scientific friends haven't a clue what cells are about. They are so fundamental to our lives that I thought I'd write a book."

Astonishing facts were presented, and these clearly captured the audience's – and in particular the pupils' – interest. "If you want to know the nature of life," he explained, "it is nothing to do with religion, but due to the behaviour of cells." He went on. "A typical cell has about ten thousand different proteins and about a million copies of each – it is a very complicated society." Indeed, it was not hard for the pupils to see why the speaker rates the role of proteins so highly ("genes are telephone numbers – they are important, but boring") and why he calls cells 'the miracle of evolution'. He proceeded to give an overview of a host of molecular biology concepts and was keen to mention his controversial theory of altruistic cannibalism to explain the origin of multicellular organisms, which "nobody takes very seriously." He proposes that a mutation occurred that prevented cells from dividing properly and they remained stuck together. "The advantage of this," he explained, "is that in hard times, these cells could eat each other."

Professor Wolpert used this opportunity to suggest that our approach to regenerative medicine should be governed by the premise that cells are the basis of all life. He feels very strongly that the early embryo is not a human being. "Anybody who has seen an early embryo and thinks of it as a human being must be dotty and out of their mind," he half-joked. "In this country, *in vitro* fertilisation leads to the loss of thirty thousand human embryos each year. Not to be for one and against the other is so logically inconsistent it's not worth talking about." 'Moral masturbation' is how Honorary Associate of the Rationalist Association sharply described the media fuss regarding the therapeutic uses of embryonic stem cells.

Rupert's Resonance

Doctor Rupert Sheldrake (Figure 4) is no stranger to controversy. A year ago, he was the target of a knifeman as he presented a lecture in New Mexico. A plant physiologist and ex-fellow of Cambridge University, Dr Sheldrake moved to India in the 1970s and turned his attention to more obscure theories of science. He is now described as a 'parapsychologist' and in books titled *Dogs that Know When Their Owners are Coming Home* and *The Sense of Being Stared At*, has written on atavism, metaphysics and telepathy (the aforementioned knifeman was convinced the academic was using mind control techniques on him!).

It was hard, then, to imagine a thinker more different to follow the Professor. "You may find his work contentious," the Chair warned as Dr Sheldrake took the stage. That said, he agreed with his predecessor on several issues. "Like Professor Wolpert," he said, "I am a tremendous enthusiast for cells. Furthermore, I believe that genes are not the magic entities that create life, shape form, mould matter and indulge in evolutionary arms races, as the rhetoric of Richard Dawkins would suggest." However, this is where the speakers' similarities end. "All the cells of the body contain the same genes. But if they are all programmed identically, how do they develop so differently?" he questioned. Dr Sheldrake showed exquisite microscope images of pollen grains and radiolarian silicon skeletons. "How can just the principles of molecular biology explain their self-assembly? It is not enough to make the right proteins at the right times, no more than it is possible to deliver the right building materials to the right site at the right time," he suggested.

Nearly thirty years ago, Dr Sheldrake published a controversial book, *A New Science of Life*. In this he introduced the concept of 'morphic resonance,' which ignited a firestorm. 'A Book for Burning?' was the title of an editorial penned at the time by Sir John Maddox, Senior Editor of *Nature*. The principle of morphic resonance is that past forms and activities of molecules, organisms and populations can influence their



equivalents in the present. Drawing on this ‘collective memory,’ patterns of development and behaviour become more probable over time. The proposed medium for this information transfer is called a morphogenetic field. “For example,” he explained, “each giraffe embryo, as it grows, tunes in by morphic resonance to the morphogenetic field of previous giraffes and this shapes its development”. He went on. “Certain curious phenomena that have eluded explanation can be explained using morphic resonance,” suggested Dr Sheldrake. He explained to the audience how his theory could account for the regeneration of the newt limb and lens. He went on to describe how, in several studies, generations of *Drosophila* exhibit a sizeable incidence of the bithorax phenotype after their distant ancestors were exposed to the teratogen, diethyl ether. Phenomena of behaviour and learning may also find their explanation in this theory, he claimed. These include the increased aptitude of rats in labs around the world to find their way out of a specific maze once the experiment was conducted in one lab and the increases in performances in successive generations in I.Q. tests during the twentieth century (the Flynn Effect). “Most scientists accept the traditional theories without question, not because they’ve thought about morphic resonance and rejected the alternatives,” he concluded, “but because they have never thought about it.”

Agreeing to Disagree

It is fair to say that Professor Wolpert does not beat about the bush. “Yes, I would like to say something,” the academic answered, in reply to an invitation from the Chair to respond to Dr Sheldrake’s lecture. “There is zero evidence whatsoever that morphic resonance plays any role in the patterning of the embryo, nor is there a requirement.” He continued, discernibly vexed. “It is mystical nonsense. You’re not only invoking a new kind of mechanism but also forces for which we have not the slightest evidence!” He highlighted an obvious problem with Dr Sheldrake’s theory, namely that it cannot account for the first occurrence of any characteristic. “If the

development of your hand is by morphic resonance of previous hands,” he questioned, “how did the first hand evolve?” Dr Sheldrake was keen to defend his theory. “I’m not suggesting that habit is the basis of all evolution – instead, it is an interplay between habit and creativity.” The implication was that morphic resonance plays no part in the emergence of new characteristics, whose basis remains in genetic mutation, but simply reinforces them once they have already developed. Professor Wolpert went on. “I can take you through the development of *Drosophila* in detail, molecule by molecule. It’s not a solid understanding, but we don’t require anything of the type Rupert suggests.” “I agree that chemicals play an important part,” responded Dr Sheldrake, who himself spent years studying the role of auxin, a plant morphogen. “However, all the different species of plant all have auxin,” he explained, “but this does not explain the differences in form; something else is responsible for that.” The Professor continued. “One of my problems is why doesn’t the development of a radiolarian affect me, so my nose becomes a bit more like a radiolarian?” “Because it works on similarity,” replied Dr Sheldrake. “For example, if I broadcast a radio station on a particular wavelength and you’re tuned into another, you could not receive it. There is a specificity of resonance, so the morphogenetic field of an identical twin will affect the other member.” This led to another question from Professor Wolpert. “So, you’d expect parents to influence their children in a remarkable way,” he supposed. “They do,” replied Dr Sheldrake, to the audience’s amusement.

Members of the audience were keen to ask questions. “Is there a more orthodox explanation for the regeneration of the newt’s limb?” asked one. Professor Wolpert responded in his familiar no-nonsense fashion. “We don’t have a good explanation for that at the moment,” he commented, “but there is a gradient of a surface molecule called Prod-1 that appears to have a role in limb regeneration.” Dr Sheldrake was then asked why, if his theory was true, all organisms could not regrow limbs.

“For example,” he explained, “each giraffe embryo, as it grows, tunes in by morphic resonance to the morphogenetic field of previous giraffes and this shapes its development”



"Declan Dillane, a member of our party, was next to ask a question. "What are the morphic fields made of?" he asked."

"Because this could be blocked from happening," he suggested. "Frogs do not regenerate limbs, but newts do – yet they are both amphibians. Perhaps the potential is there but it is not realised. At the moment there is a lot of research into the unleashing latent regenerative capacities." Dr Sheldrake concluded by airing another suggestion. "I think that the 'phantom limbs' experienced by amputees are the fields of the missing limb," he proposed.

Declan Dillane, a member of our party, was next to ask a question. "What are the morphogenetic fields made of?" he asked. This, I thought, was a valid point. Many have a problem with morphic resonance because the transfer of information is not through any conventional interaction but mysteriously through time and space. Yet is interesting in this regard that some quantum physicists have supported Dr Sheldrake's hypothesis, describing it as one of the first to reconcile twentieth-century breakthroughs in quantum physics with biology. The speaker answered by drawing parallels with the problems faced by academics in the nineteenth century as they tried to identify the nature of electromagnetic and gravitational fields. "If you say that the fields can't exist because they're not made of 'stuff,'" he concluded, "the same argument will get rid of all the fields of conventional physics." Declan went on. "But how, then, are the fields passed between two independent creatures without being intercepted or changed?" This question was sharp in light of Dr Sheldrake's explanation – because one could argue that no other field can be transmitted in such a way. "If you have an energy transfer it is attenuated by distance, but if it is information there's no reason it should be attenuated – that's the postulate." However, the speaker concluded by conceding that "some would say that is totally improbable."

The final question of the evening concerned the implications of morphic resonance for disease. "Does your theory extend to tumours?" a member of

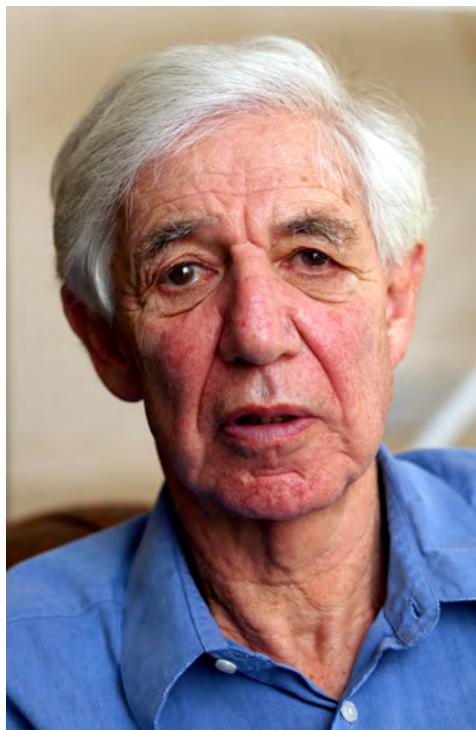
the audience asked. "I would imagine that for tumours that are aggressive there would be a risk of their transfer to family members or doctors that are treating them." "Very good question," agreed Professor Wolpert. Dr Sheldrake responded. "I believe that diseases have their own morphic fields – explaining the existence of syndromes with features that we recognise." He went on. "There is more to a cancer than just a gene mutation; tumours have their own structures and vascular supplies – they're not totally chaotic and so are likely to resonate with other similar tumours." "However," he reiterated, "similarity is the key to this. It doesn't mean that if you go into a room with someone with cancer you'll catch it, any more than if you entered a room with Einstein you will become a mathematical genius!"

An interesting offshoot from the debate was a challenge put forward by Dr Sheldrake to Professor Wolpert. It concerned whether there may be the possibility in the future of predicting the structure of an organism from the knowledge of its genome. "At present, given the genome of an egg, we cannot predict the way an embryo will develop," he explained, to which Professor Wolpert agreed. "This will require an enormous computation involving all the many thousands of components, particularly proteins, so that the behaviour of almost every cell will be known." He imagined a scenario in which, by May 1, 2029, given the fertilized egg of any animal, we will be able to predict in at least one case all the details of the animal that develops from it, including any abnormalities. "We will also be able to program the egg to develop into any shape we want, within the limits of the species," he concluded. Professor Wolpert wagers that this will happen, whilst Dr Sheldrake predicted, on the basis of his theory, that it will not. At stake is a case of fine port, to be stored in the Wine Society's cellars and claimed by the correct theorist. "Or by our heirs," joked Dr Sheldrake to the near-octogenarian Professor.



Back in School

Back in the classroom, I felt I ought to clarify to the pupils a few of the issues addressed during the debate. As far as was possible given my background, I tried to reiterate several of the points made during the lecture without bias. This was not the first time I have had to put my views on hold and explain two theories in a balanced manner – I recently lectured on the theories of evolution versus creationism and have, with as much objectivity as I could muster, taught the principles of homeopathy! I explained that morphic resonance was presented through self-publication and has not been vetted by the peer review process. More importantly, I described that whilst it may have once offered a convenient explanation for self-assembly, our understanding of morphogenesis has improved tremendously since morphic resonance was proposed nearly three decades ago. That said, I pointed out that Dr Sheldrake's marriage of the emergent science of epigenetics with his theory was a sound attempt to reinforce its legitimacy in the face of recent discoveries.



School pupils encounter very little embryology until Advanced Level study. Indeed, the National Curriculum goes no further beyond requiring pupils to distinguish between the embryo and the fetus during Key Stage Three (age 11–14) and little more at GCSE level (age 15–16). Nevertheless, an intelligent discussion among our group pleasantly ensued. The majority view among the party was a preference for the traditionalist views of Professor Wolpert. "Although Dr Sheldrake had a response to all questions thrown at him," one pupil recalled, "there is very little solid evidence that proves his theory plays a part in development." Indeed, it emerged that I was not the only one to notice that an exacerbated Professor Wolpert scaled down his efforts to challenge the theory as the debate went on. We all agreed, on the basis of this event, that the Professor is unlikely to ever be persuaded of morphic resonance but that Dr Sheldrake is unyielding in his defence of his theory. A worthwhile experience was had by all and I was satisfied that this event inspired an interest in developmental biology in a few of our pupils as they start to think about their future study choices.

David Martindill

"This was not the first time I have had to put my views on hold and explain two theories in a balanced manner."

"Indeed, it emerged that I was not the only one to notice that an exacerbated Professor Wolpert scaled down his efforts to challenge the theory as the debate went on."



*The protagonists:
Prof. Wolpert (left)
and Dr Sheldrake
(right)*



BSDB Spring Meeting 2010

Latest meetings news

Check the BSDB website for latest meetings updates and to submit details of meetings to be advertised to members.

<http://www.bsdb.org>

12-15 April, 2010. Warwick (venue to be confirmed)

Joint symposium with BSCB. BSDB organisers: Josh Brickman and Kate Lewis.

Theme: Developmental Biology in the Postgenomic era: 20 years since the human genome project began and 10 years since the publication of the human genome

sequence.

Sessions include Evolution and development — genomes and beyond. Limb development: classical development in a post-genomic era. Genomic science achievements and challenges. Mechanisms of gene regulation. Interaction of signalling pathways.

Future BSDB meetings

Ideas for a meeting?

A major task of the BSDB Committee is to host high quality scientific meetings. We welcome suggestions for future topics for meetings or for a half-day themed session at the Spring Symposium. Contact James Briscoe

Autumn 2010

Development of the peripheral nervous system/sensory systems.

7–9 September, St Anne's College, Oxford

Organised by Jo Begbie, Anthony Graham, Darren Williams.

Spring 2011

Joint Spring Meeting with BSCB

Date and location to be confirmed. BSDB organisers: Chris Thompson and Juan Pablo Couso

Announcing a New Journal

DMM Disease Models & Mechanisms

The use of model organisms to advance human health

www.biologists.com/dmm



Other meetings of interest

Physiology 2009

7–10 July 2009
Dublin, Ireland

The main meeting of The Physiological Society

<http://www.physoc.org/meetings>

SEB Symposium: the cytoskeleton in cell morphogenesis

24–26 August 2009
University of Durham

<http://www.sebiology.org/meetings/Cell09/Cell-symposium-2009>

European Drosophila Research Conference

18–21 November 2009
Nice, France

<http://www.unice.fr/ibdc/EDRC/accueil.htm>

Surviving as a Woman in Science

13 November 2009
BioPark, Hertfordshire

Following on from our successful Woman in Science event held in November 2007, we are pleased to announce our 2009 follow up which will focus on Career development for women at all stages of their career and life. This meeting has CPD approval

<http://www.regonline.co.uk/surviving09>

Microarray- and Deep sequencing-based profiling approaches: the technological evolution continues

9 July 2009
BioPark, Hertfordshire
<http://www.regonline.co.uk/microarray09>

Toll-like receptors, Nod-like Protein and RIG-like receptors: pathogen sensors of innate immunity

9 October 2009
BioPark, Hertfordshire
Joint BSCB Spring Meeting and Biochemical Society Focused Meeting 2009

Significant advances in our understanding of the innate immune recognition have been made in the last decade following the identification of three families of pattern recognition receptors: Toll-like receptors (TLRs), NOD-like receptors (NLRs) and RIG-I-like receptors (RLRs). An overview of these three families of receptors and provide the most recent advances in the area of innate immune pattern recognition

<http://www.regonline.co.uk/TLR09>

EMBO Conference Series on Protein Synthesis and Translational Control

9–13 September 2009
EMBL, Heidelberg
http://www-db.embl.d/jss/EmblGroupsOrg/conf_115

Latest meetings news

Check the BSDB website for latest meetings updates and to submit details of meetings to be advertised to members.
<http://www.bsdb.org>



EMBO Conference on Morphogenesis and Dynamics of Multicellular Systems

2–6 October 2009.
EMBL, Heidelberg

http://www-db.embl.d/jss/EmblGroupsOrg/conf_118

Frontiers in Stem Cells and Regeneration, Advanced Training Course

4–10 October 2009
Woods Hole, Massachusetts, USA

The Frontiers in Stem Cells and Regeneration Advanced Training Course is a dynamic, evolving laboratory and lecture course that includes the complete array of biological and medical perspectives from fundamental basic biology of "stemness" and mechanisms of regeneration through evaluation of pluripotent stem cells for therapeutic benefit. The NIH sponsored course is designed for postdoctoral fellows, newly independent scientists, and established investigators seeking comprehensive and sophisticated training in research strategies and state-of-the-art cellular, molecular and genetic approaches for advancing human embryonic stem cell research.

<http://www.pdc.magee.edu>

Workshop: Mechanisms of Organ Regeneration in Model Systems

5–7 October 2009.
Baeza, Spain

As part of the program "Current Trends in Biomedicine" at the Universidad Internacional de Andalucia (UNIA), we would like to bring your attention to the workshop: "Mechanisms of Organ Regeneration in Model Systems", to be held Baeza Spain. This intimate meeting will cover a variety of model organisms, including zebrafish, and their relevance to regenerative approaches in biomedicine. Please join us for a high-end meeting in a beautiful setting. Registration and abstract deadline is 24 July.

<http://www.unia.es/content/view/875/586>

The EMBO Meeting

29 August – 1 September 2009.
Amsterdam

The EMBO Meeting takes over from former European Life Sciences Organisation meetings following the fusion of ELSO into EMBO.

<http://the-embo-meeting.org>

Journal discounts for members

BSDB member discounts from Elsevier Press:

Mechanisms of Development (print): \$120

Mechanisms of Development + Gene Expression Patterns (print): \$125

Developmental Biology (print): \$380



Reviewing a book for the BSDB

Suggestions for future book reviews are always welcome. If you know a book you think should be reviewed, please contact the Editor. Reviewers receive a free copy of the book for their trouble.

Here are some possibilities:

From Allen Lane

Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body
Neil Shubin

Germline Stem Cells

Hou
978-1-603-27213-1

From CUP

RNA Interference Technology: From Basic Science to Drug Development (Hardback)
Edited by Krishnarao Appasani
Cutting-edge overview of RNA interference (RNAi) technology, covering both fundamental science and applications.
<http://www.cambridge.org/0521836778>

Exocytosis and Endocytosis
Ivanov
978-1-588-29865-2

Plant Embryogenesis
Suarez and Bozhkov
978-1-588-29931-4

Hedgehog Signaling Protocols
Methods in Molecular Biology, Vol 397
J.I. Horabin
978-1-58829-692-4

From Humana Press

Drosophila: Methods and Protocols
Dahmann
978-1-588-29817-1

Epidermal Growth Factor
Patel & Bertics,
1-588-29421-8

BSDB Discount from CSHL Press

Cold Spring Harbor Laboratory Press is offering a 15% discount on titles for BSDB members. In order to take advantage of this, visit their special offers page (<http://www.scionpublishing.com/special/index.php>).

Recent titles from CSHL Press:

The Writing Life of James D. Watson.
Professor, Promotor, Provocateur
Errol Friedberg
087969 7008

The Condensed Protocols *From Molecular Cloning: A Laboratory Manual*

This manual is a single-volume adaptation of the three-volume third edition of *Molecular Cloning: A Laboratory Manual*.

Gastrulation. From Cells to Embryos
Claudio Stern
087969 7075

Won for All: How the *Drosophila* Genome Was Sequenced
Michael Ashburner

Fly Pushing. The Theory and Practice of Drosophila Genetics, Second Edition
Ralph Greenspan
087969 7113

The Strongest Boy in the World: How Genetic Information is Reshaping Our Lives
Philip R. Reilly



18 BSDB Committee

The main function of the BSDB Committee is to organise our meetings, from deciding on appropriate topics to arranging organisers and venues. If you have any ideas on topics for a good meeting, or on a good venue, don't hesitate to convey them to James Briscoe (or another committee member). The officers of the Society will be happy to answer any questions relating to their specific subjects.

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ISSN 0925-4773;
2008, Volume 125
12 issues

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The BSDB gratefully acknowledges the continuing financial support of the Company of Biologists Ltd (CoB).

<http://www.biologists.com/web/index.html>

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