PN Physiology News

Issue 100 / Autumn 2015

The Physiological Society

BAP
British Association for Psychopharmacology

Certificate in Non-Clinical Psychopharmacology

6th – 10th March 2016
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In 2001 the BAP launched the Pre-clinical Certificate in Psychopharmacology with the support of the BBSRC. This modular Certificate programme was highly successful. The Certificate moved to its new format and became a 4 day residential course which was held in Cambridge in February 2014, and will be held every two years.

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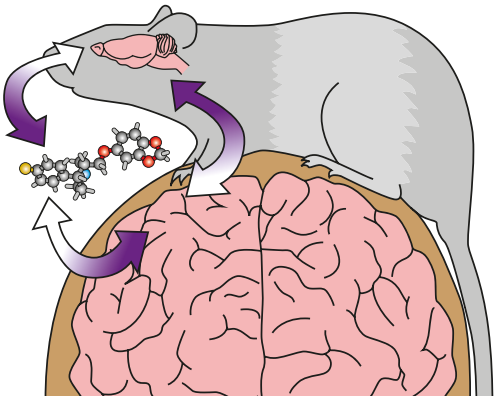

Physiology News

We welcome feedback on our membership magazine, or letters and suggestions for articles for publication, including book reviews, from Physiological Society Members. Please email **magazine@physoc.org**

Physiology News is one of the benefits of membership of The Physiological Society, along with reduced registration rates for our high-profile events, free online access to The Physiological Society's leading journals, *The Journal of Physiology* and *Experimental Physiology,* and travel grants to attend scientific meetings. Membership of The Physiological Society offers you access to the largest network of physiologists in Europe.

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Membership Fees for 2015	**FEES**	
Membership category	Direct Debit	Non-Direct Debit
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Ordinary Retired Member	–	–
Affiliate	£17	£22
Associate	£38	£48
Undergraduate	–	–

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The 100th *Physiology News* – Rounding Up

David Miller

Chair, History and Archives;
Hon. Research Fellow,
University of Glasgow

It has been a fascinating privilege to guest edit the 100th edition of *Physiology News*. The strange interest we have in 'round' numbers encourages both retrospective and prospective views of the Society and its now well-established membership rag.

What better place to start than Tilli Tansey's article 'Hundreds and Thousands'? This year, The Society has celebrated 100 years since the first election of women to membership. Tilli relates that this milestone is complemented by the round-number fact that The Society had previously also completed its 1000th meeting.

Helga Groll has compiled a thought-provoking article exploring women as science writers and popularisers through the ages. Appropriately, Lesley Anson brings us up-to-date by describing her own career in science editing and publishing.

More round numbers? Amongst women physiologists active at the time of that first election, read the compelling story of Mabel Purefoy FitzGerald by Martha Tissot van Patot. Mabel only became a member in the year of her 100th birthday when the Society belatedly recognised a major oversight.

I invited philosopher John Dupré to write a piece on his stimulating work to understand living systems as having a 'process' ontology. I was struck that his recent work encapsulates our discipline; physiology seen as 'how the body works'. But, as you will see, John reveals that there is no proper distinction between 'the body' and 'the works' – a fascinating new insight into that well-worn phrase 'form and function'.

John's philosophy surely marries with Denis Noble's championing of the emerging central role for physiology in evolutionary and 'systems' biology. Denis reports his recent visit to China: it confirms his ambassadorship for the discipline in research and teaching.

PN's real Editor, Roger Thomas, has done some fine detective work to track down the first issue of *PN*. It was preserved thanks to Bob Banks' squirrel-like document storage habit. Coincidentally, Bob's own work has just been celebrated upon his recent retirement.

Author sequence can be something of a battleground in the scramble to 'publish or die' in research science. Even Roger Thomas' trawl for *PN*1 reached Bob Banks in part due to alphabetic considerations – he had sent emails out only to members with surnames beginning with A or B! Richard Boyd's sparkling article drills into the arguments behind alphabetical author listing that held sway with The Journal for many years. Personally, I find AV Hill's case from the 1920s and 30s is still compelling now – and charmingly expressed.

Beyond features focused on *PN*100, you will find our regular articles on meetings, the membership, Physiology Feeds and the rest. On the Letters page, Richard Naftalin addresses the recent controversy around our Honorary Member, Sir Tim Hunt.

The Editorial Board hope *Physiology News* continues to provide a convenient and attractive place for The Society to report on its doings, its policies, programmes and people. Articles reflect the broad sweep of physiological science itself as well as the women and men who sustain the discipline through their research, teaching and scholarship. Keep reading and writing and *PN*200 will surely be here soon...

Letters to the Editor

Wizard – Hunt FRS

Richard Naftalin

There are many regrettable aspects to the Tim Hunt affair, perhaps the most - the words he spoke in jest, *pour épater la bourgeoisie*. 'For they sow the wind and they reap the whirlwind'.... etc. - in his case a tornado. As my late friend and Head of Department, Peter Baker was wont to say, 'Academic freedom is the right of academics to make fools of themselves –occasionally': he may have said it to me... or himself, or maybe even you.

Nevertheless that is not the only concern. University College, London's hasty action in requesting Hunt's resignation instead of waiting for the storm to abate, as it surely will (or has already), should not be seen as simply a crowd-pleasing, grandstanding gesture by a trigger happy HR department.

It is yet another exercise in administrative power over academe. Another scalp - useful in making sure that the rest of the pesky academics stay in line.

If they can do this to someone as eminent as Hunt, for no real cause other than temporary embarrassment of an Institution that manifestly gives women a fair deal, what else will they do if someone raises real issues – such as the gross disparity in remuneration between academic and senior admin staff, or the appalling conditions of employment of temporary staff and junior academics? Men and women alike!

Members of The Society, particularly those who have had an association with UCL, should make known their displeasure at this lapse from UCL's normally decent commonsensical standards and seek to reverse their over-heavy reaction to Tim Hunt's lapse in good taste and sense.

100 up

Austin Elliott
Former *PN* Editor

It is quite something seeing *Physiology News* reach its hundredth issue, especially when you've been involved in producing rather a lot of them. Fascinating to look back on the change from a photocopied newsletter, to a newsletter with a cover page, to a bigger magazine, and then through several revamps, the latest coming in Spring 2012. It is also - I think - amazing to see what a bunch of mildly-crazed enthusiasts can do, given a common purpose and a little bit of a budget. For those interested in the older history of the magazine, and its origins in the Society's newsletter -see the current Editor's article on page 11 - there is an article covering this topic at some length in *PN*54 (p30-p32). You can read contributions from many previous Editors there.

My own editorial involvement with *PN* began when I joined Bill Winlow's new Editorial Group in Autumn 1998, preparing for the Spring 1999 issue (*PN*34 - I had to write a Science News & Views piece, as we didn't have any others to go in). It finished, much later, when I ended eight years in the Editor's chair by penning my farewell 'Letter to the Next Editor' in the Winter 2011 issue (Editorial, *PN* 85), before handing over to Mike Collis. That makes 51 issues, or just over half the magazine's life. It also means thirteen years of editorial meetings, possibly explaining the chronic meeting-phobia I now have. More seriously, of all the 'committee' meetings that being an academic scientist has involved me in, those for the magazine were by a long distance the most enjoyable - see 'enthusiasts', above.

Whilst the appearance of *PN* offers a visual record of the magazine's evolution, it is content that really gets editors excited. As *PN* grew under its various editors, it added content, and features - to my mind the lifeblood of a successful magazine. Publishing interesting stuff, and stuff that people want to read, must be what it's about, together with things that get people to think, to discuss, to agree and disagree. 'If everyone likes everything you're running, then you're doing it wrong' is the sort of thing I might well have declaimed at an Editorial Group meeting. There are many issues facing physiology, and the other sciences; where better to air them than in *PN*? And in case you hadn't noticed, that was a call on the readers as well as the editors.

Anyway, here's to many more issues of *PN* under the new Editorial team and those who follow it. Long, as they say, may it continue.

Corrigendum

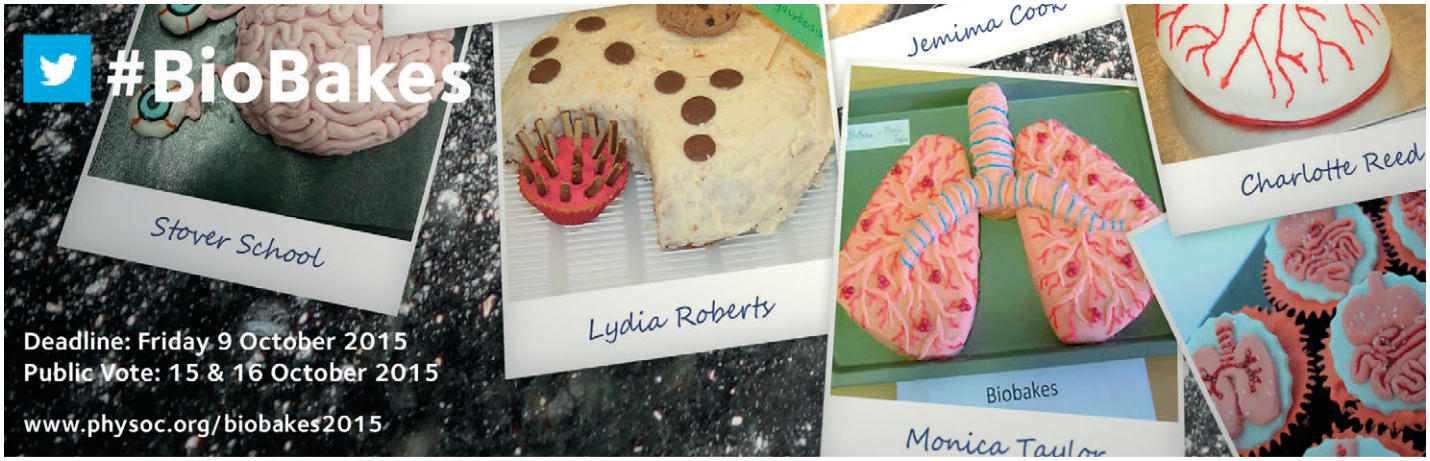
Yasmin
University of Cambridge, UK

I would like to request a corrigendum. I was given permission by Prof N Westerhoff to use an illustration of his as Figure 1 in our featured article '*A man is as old as his arteries...*' in *Physiology News* Issue 98 and this was not cited in the references.

The reference to be included in the corrigendum for Figure 1 is:
Westerhof N, Lankhaar JW & Westerhof BE (2009). The arterial Windkessel. *Med Biol Eng Comput* **47**, 131–141.

Question for the Editor or comment on a recent *PN* article?

Please send your correspondence to **magazine@physoc.org**



Women physiologists:
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020 7269 5710

2015 The Physiological Society

Celebrating 100 years of women in The Society

Centenary of women members marked

3 July 2015 marked the day when - 100 years ago - The Physiological Society formally admitted women as members. To commemorate this milestone, The Physiological Society has published a book highlighting the achievements and contributions of 20th and 21st century women physiologists. The book launch took place during the annual Society Meeting Physiology 2015, held in Cardiff, Motorpoint Arena. Copies are available from The Society for £5 each.

Annual General Meeting 2015

The AGM took place during Physiology 2015 at the Motorpoint Arena in Cardiff with 65 Members taking time out of the busy conference schedule to attend. Professor Ole Petersen of Cardiff University, and new Honorary Member, chaired the meeting.

Reports were given by President, Richard Vaughan-Jones, Chief Executive, Philip Wright, and the Editors-in-Chief of The Society's three journals.

The Society would like to thank the following Council members, who stood down at the end of their terms: Rebecca Burton, William Colledge, Michael Evans, Stewart Sage, David Thwaites and the affiliate representatives, Fiona Hatch and Ruth Norman.

Guy Bewick, Frank Sengpiel and Holly Shiels were duly elected to Council as Trustees and Directors of The Society for a four-year term. In addition, Rachel McCormack and Mathew Piasecki were elected for a two-year term as affiliate representatives.

The Society is also delighted to welcome ten new Honorary Members:

- Lynn Bindman
- Stuart Cull-Candy
- Judy Harris
- Bridget Lumb
- Edvard I Moser
- May-Britt Moser
- John O'Keefe
- Ole Petersen
- Richard W Tsien
- Susan Wray

Imperial College student wins 2015 Rob Clarke Awards

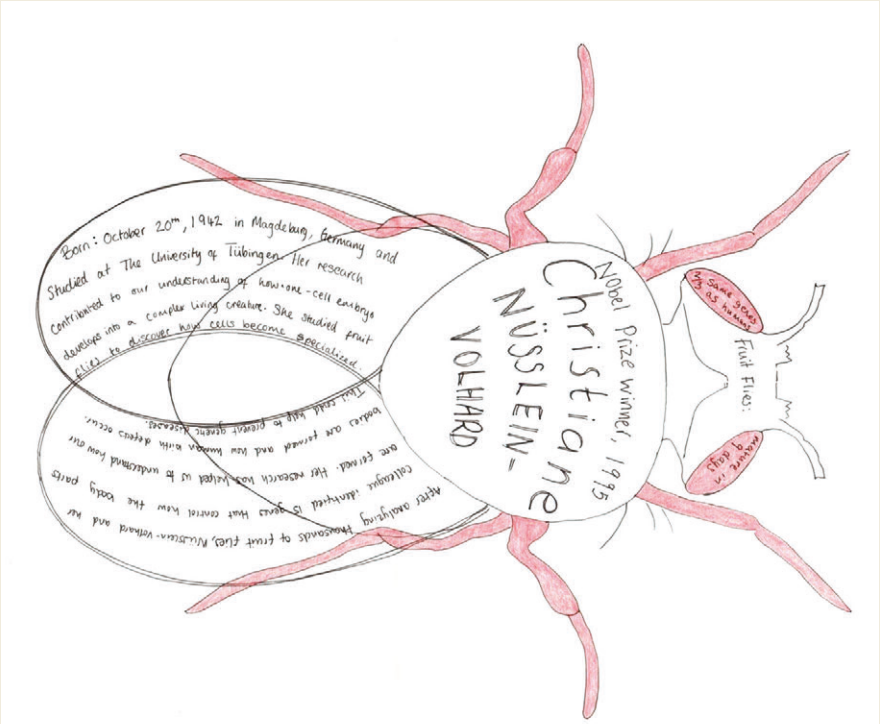
The Rob Clarke Awards are always a highlight of The Society's annual meeting, offering a chance for recent graduates to present their undergraduate research at what is often their very first scientific meeting. If their abstract is shortlisted, they are invited to present their project as a poster at the meeting and receive £200 to support their attendance.

This year, 19 students were shortlisted and invited to Physiology 2015 for final judging. The judges were impressed with all the finalists but agreed that Zelie Britton, from Imperial College, London stood out from the others, both for the quality of her poster on 'Menthol as an anti-tussive: evidence for direct modulation of airway sensory nerves' and the eloquent, knowledgeable way in which she presented it.

Zelie said, 'The Physiological Society meeting in Cardiff was very enjoyable, offering me the opportunity to present a poster at a national conference and to discover the work of other labs. Thank you so much to all involved in organising the Rob Clarke Awards.'

We would like to thank all the students and judges who took part in the competition.

2015 Rob Clarke Award winner, Zelie Britton, with Deputy President, David Eisner



Elsie Moore's prize-winning poster entry

Thomas Hardye School student wins 'Women in Physiology' competition

We are thrilled to announce that Elsie Moore, a 15 year-old from The Thomas Hardye School in Dorchester, has won our national 'Women in Physiology' poster competition.

To mark 100 years of women's membership of The Physiological Society, we invited 11-16 year-olds to design a poster focusing on the achievements of women who have won the Nobel Prize for Physiology or Medicine. Seven entries were shortlisted by a panel of judges and then displayed within the exhibition at Physiology 2015, where attendees were invited to vote for which they considered to be the best poster.

Elsie received the most votes for her poster on Christiane Nüsslein-Volhard and hence will receive a certificate, £50 Amazon gift voucher and a visit from a prominent female physiologist to her school. The originality and creativity of her poster attracted a lot of praise from attendees throughout the meeting.

We are absolutely delighted with the variety of entries we received and would like to thank everyone who entered.

Bob Banks Special Symposium proceedings now published

A special volume publication of the proceedings of a Special Symposium, held at Durham University in September 2014 has been published to mark the contribution of Professor Bob Banks on his retirement. This is now available at **http://onlinelibrary.wiley.com/doi/10.1111/joa.2015.227.issue-2/issuetoc**

The content is dedicated to showing the intimate relationship and co-dependence between physiology and anatomy from the 1890s to present. The meeting was sponsored by The Society and had a very strong representation of Society Members and *J Physiol* contributors as attendees and presenters (current and retired).

Physiology Feed

Bringing you snippets of the latest intriguing research

Seeing without eyes

By using opsins (light-sensitive proteins), the skin of the California two-spot octopus can sense light even without input from the central nervous system.

DOI: 10.1242/jeb.110908

Advantages of ageing

Researchers found that age can protect blood vessels against oxidative stress. After stress exposure, cells in the inner layer of blood vessels (endothelium) showed abnormally high calcium levels in young mice, compared with older mice, which could damage the cells..

DOI: 10.1113/JP270169

Virtual reality

Scientists have developed a new machine vision algorithm, which can be applied in virtual reality simulation, based on the visual tracking abilities of dragonflies.

DOI: 10.1098/rsif.2015.0083

Gut feeling

Scientists and clinicians have carried out the first detailed study of how our intestinal tract changes as we age, and how this determines our overall health.

DOI: 10.1042/CS20150046

Mighty hippocampus

Scientists are one step closer to understanding how the brain regulates memory and mood, thanks to the discovery of two distinct types of stem cells in the hippocampus. The cells give rise to new neurons, which explains the varied functions of the hippocampus.

DOI: 10.1523/JNEUROSCI.0504-15.2015

Memories are made of these

A team of New York University neuroscientists discovered how a pair of growth factor molecules contributes to long-term memory formation.

DOI: 10.1016/j.neuron.2015.04.025

Jumping across stepping stones

Researchers suggest that memories are formed by stringing 'snapshots' of events together, as opposed to a continuous 'video' recording.

DOI: 10.1126/science.aaa9633

continues overleaf

Physiology Feed

Bringing you snippets of the latest intriguing research

Meeting Clint Eastwood at the Tower of Pisa

Neurons in the medial temporal lobe associated with episodic memory play a key role in rapidly forming memories about every day events.

DOI: 10.1016/j.neuron.2015.06.016

The physiology of anger

Why do we get angry when we're hungry? Drops in glucose levels leads to a release of a variety of hormones that are involved in regulating 'fight or flight' behaviour, e.g. aggression, which explains why people often get irritated when they are hungry.

http://bit.ly/1HVgqiV5

Athletes should drink only when thirsty!

Over-hydration during training could be fatal. It can lead to exercise-associated hyponatremia (EAH), a condition where the body has too much water relative to its salt level. EAH can lead to significant neurological problems and in the worst case even be fatal.

DOI: 10.1097/JSM.0000000000000223

How neurons remember

Back-propagating electrical impulses activate a receptor inside the cell, resulting in long-term changes in the calcium response in specific neuronal compartments.

DOI: 10.1371/journal.pbio.1002181

Perceiving polarization with the naked eye

Researchers have adopted modified LCD (liquid crystal display) technology to study the perception of polarised light in humans.

DOI: 10.1098/rspb.2015.0338

Brain inflammation linked to anxiety and depression

Brain inflammation caused by chronic nerve pain alters activity in regions that regulate mood and motivation, suggesting for the first time that a direct biophysical link exists between long-term pain and depression.

DOI: 10.1523/JNEUROSCI.4036-14.2015

Spotted some interesting research? Send it to us at **magazine@physoc.org**

Policy Focus

Anyone for Brexit?

Universities UK (UUK) has formally launched a campaign against 'Brexit' (British exit from the EU). At its simplest, those in favour of Brexit argue that most of the EU benefits available to the UK would still be available without it. Those against, assert this is far too complacent a view – you have to be 'in it to win it'.

The Universities for Europe campaign led by UUK aims to ensure that the university sector has a strong and positive voice in the referendum debate. UUK explains *'The campaign will highlight how the UK's membership of the European Union enhances university research and education which in turn benefits British people, the economy and our society'.*

Speaking at the campaign launch, Labour MP Chuka Umuna and Conservative MP Damian Green pointed to a number of benefits the Higher Education sector derives from EU membership:

- The UK benefits from £1.2bn annually in European research funding
- The 24 Russell Group universities receive about £400 million a year in EU research funds – 11% of their income
- In 2014, British researchers won 20% of the European Research Council's flagship advanced grants, more than any other nationality

Three examples were highlighted to illustrate the importance of the EU:

1. Development of Graphene at Manchester University - the flexible material that is 200 times stronger than steel. The team received start-up funding for their work from the EU in 2007, three years before they were awarded the Nobel Prize. And the EU went on to invest a further £23 million in establishing the National Graphene Institute in Manchester from 2013. The global market for graphene is expected to be more than £250m by the middle of the next decade.
2. FORECEE an international project, involving 14 European partners has been awarded €8 million (£5.7 million) funding through Horizon 2020, the European Union's research and innovation programme. This is alongside €1 million raised by the Eve Appeal, a UK charity which fundraises for research into women's cancers at UCL.
3. Erasmus, led by the EU is one of the largest funding programs for study abroad in the world. Since its establishment in 1987, 3 million people have been supported. Britain has the 6th highest number of successful applicants across the 28 members, according to the European Commission in 2012/13; 14,500 British students studied elsewhere in Europe thanks to Erasmus - a 7% rise from the previous year. The new improved version of Erasmus agreed for the next 7 years will extend grants to high school students, volunteers and apprentices, with an estimated 162,000 British youngsters expected to benefit from it during this period.

Call for evidence

Universities UK is seeking up to five case studies from each University illustrating how membership of the EU has enabled their work to benefit the UK economy and society, for instance: research that saves lives or leads to new products; life changing experiences of UK students or academics who studied or worked abroad, jobs or companies created in local communities, and/ or alliances that enabled global influence or trade.

For more information about the campaign and to submit case studies, please visit: http://www.universitiesforeurope.com/Pages/Home.aspx#.VbohGXnbKHt

Undergraduate Membership is now free of charge

Today's life science undergraduates are The Society's future leaders, so we are delighted to announce that Undergraduates can now sign up to The Society free of charge. Please assist us in spreading this message across your university and encouraging your students and colleagues to join the physiology family.

Interested in these or any other policy related issues? Please contact us via **policy@physoc.org**

The Editor's search for the first issue of *Physiology News*

Roger Thomas

Editor, *Physiology News*

When appointed as Editor in February 2015, I resolved to try to fill in the blank on the Society's website where the 1992 first issue of *Physiology News* should have been. No-one at HHH knew where a copy might be found but both the Wellcome and the British Library's catalogues listed old Newsletter copies so I resolved to search both Libraries on my next visit to London.

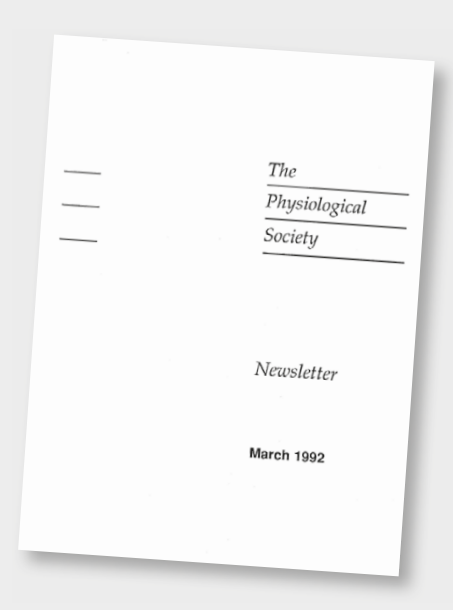
Items from the Wellcome Library catalogue had to be ordered in advance, so I requested the earliest issue they listed for the magazine. I also noted the supposed shelf location for what the British Library had in its catalogue. On 16 March I walked from King's Cross to the Wellcome Library and found that what I had requested was actually the Newsletter of October 1985 - a single sheet of paper. When I then walked back to the British Library and sought The Physiological Society material, I was told it was kept in Yorkshire! A very helpful librarian showed me how to request that the material be sent down to London.

Two days later, the British Library had a box for me in London. Instead of making the journey to London, I managed to telephone the science desk (via Yorkshire) and asked the librarian to look inside the box. He told me that it contained *PN* issue 30, with two footballers on the cover!

Next, I emailed the Yorkshire branch to please check if they had anything earlier. Two days later they emailed that they had not, but that they had scoured the Wellcome Library catalogue and found what seemed to be a complete listing for the Society's Newsletter/Magazine/News, from 1985 to date. So a few days later I went down to see what the Wellcome Library had for 1991 and 1992. Sadly, they had nothing for 1992 before May (*PN* Number Two). I began to despair, and wondered if Number One had in fact ever been published!

The 1992 editor was Kwabena Appenteng, but he had long retired to Africa and was out of touch. So I sought his assistant, 'Heather Dalitz Oxford' on Google. There were entries suggesting she had worked for St Anthony's College, but the Porter did not know of her. I telephoned both numbers for Dalitz in the Oxford phone directory and left messages, but had no responses. Finally I tried phoning St Anthony's College again, and asked for the Registrar. At last I struck lucky. The assistant Registrar knew Ms Dalitz and - whilst not prepared to give me her address - did agree to forward an email to her. Next day I received a very detailed email from Heather explaining that *PN* Number 1 was the March 1992 issue, prepared for the Newcastle meeting. Full details of the early publications were in a report published in the Society's 1993 Annual Report. (See **http://issuu.com/physoc/docs/annual_report_31.12.1993**, pages 25 and 26).

Now I knew that I sought the March 1992 issue of the Magazine, I re-doubled my efforts. I tried emailing a variety of old members, and eventually, using an old email list, most older members with names beginning with A or B. Bob Banks of Durham answered 'I will almost certainly have a copy, and I'm about to go to my old office to continue clearing out following my retirement. If I find it I'll get back to you.' I crossed my fingers and sent a very enthusiastic reply. Later that day he confirmed he did have a copy, and would send me a scanned pdf next day. I slept well that night. He did indeed send the pdf, and The Society's website archive is now complete. Indeed Bob later sent me a complete set of old Newsletters, going back to 1983. I will try to pass these on to fill in the gaps in the Wellcome Library.



PN has changed a great deal since the first issue published in March 1992

'Bob Banks answered, 'I will almost certainly have a copy...'

Testing young brains: the English Brain Bee challenge

Katarina Zimmer

University College, London, UK

On Friday 12 June, 47 high school students congregated at University College, London to take part in the inaugural English Brain Bee, a neuroscience quiz-style competition. The majority of participants were Year 9 students from the nearby Maria Fidelis Catholic School; the rest were a Year 10 group from Simon Balle School in Hertford.

The English Brain Bee is the most recent addition to over 30 countries that participate in the International Brain Bee, founded by Norbert Myslinski in 1998 to encourage young students to learn about the human brain and pursue careers in neuroscientific research. An estimated 30,000 students compete annually worldwide, in countries as diverse as the USA, Nigeria and Macau. They can advance through three tiers of competition, from local to national and ultimately to the International Championship.

Participants prepared by studying the 60-page booklet *The Science of the Brain*, a publication of the British Neuroscience Association which is available to download online. This covers a breadth of topics often in degree-level detail, such as the neurological mechanisms underlying sleep, stress and motor function. Additionally a primer on neuroanatomy was provided to aid the students' understanding of structures such as the hippocampus and ventricular system.

A team of six UCL science undergraduate volunteers prepared a range of activities and challenges. After a short written quiz to warm up, the first question-and-answer session began. Participants individually approached the front of the lecture theatre to answer a question posed by the esteemed judging panel, UCL professors, Stephen Price and Jason Rihel as well as PhD student, Łukasz Kopeć.

2014 Brain Bee participants

After lunch the students listened with interest to a talk by Prof Rihel about his research, the mechanisms underlying sleep in zebrafish. The neuroanatomy section followed, where participants had to identify the structures indicated on brain models and histological images, and their associated functions.

Those who finished had the opportunity to perform some fun neuroscience experiments, such as trying 'miracle fruit' tablets that alter taste perception, and guess which neurological mechanisms were at work. 'It was such a pleasure to see all the students doing the experiments we had prepared for them and seeing that they were genuinely interested in the science behind them,' observed Marta Tondera of the Brain Bee organising committee.

Finally, all scores were tallied and the top ten participants were selected to take part in the ultimate question-and-answer session, which would determine the champion of the competition. Tension mounted during the final rounds, where more than one incorrect answer would result in elimination. The rest of the lecture theatre fell silent as the finalists attempted to answer questions such as the propagation of an action potential.

Eventually Elspeth Grace from Simon Balle School became the first-ever champion of the English Brain Bee. She was awarded an engraved trophy and a £100 Amazon gift voucher. Runners-up were India Warman and Georgina Goddard, both from Simon Balle School.

The Brain Bee was not only an enriching experience for the prize-winners, but was enjoyable for all participants, volunteers, teachers and judges involved. 'I had great fun on the drive in', said Dr Gareth Jones, a teacher from Simon Balle School, 'A minibus full of kids talking about the hippocampus and basal ganglia! Cool huh!'

The English Brain Bee will continue to take place annually. The vision is for it to branch out into smaller, local-scale competitions across the country, to reach an extent comparable to countries with the more established Brain Bee communities, such as the USA or Australia. By doing so, the Brain Bee aspires to 'spread the word' of neuroscience amongst the next generation of students, sparking an interest for scientific research as a whole and motivating the pursuit of neuroscience as a career.

The English Brain Bee was sponsored by The Physiological Society and UCL's Volunteering Services Unit. To learn more, visit www.englishbrainbee.org

Interacting with parliamentarians: parliamentary links day 2015

Fiona Hatch

University of Surrey, UK

To ensure professional societies have their voice heard, they need to be able to interact with parliamentarians. One such way was the Parliamentary Links Day organised by Stephen Benn from the Royal Society of Biology, hosted at the Houses of Parliament on 23 June 2015 with special guests Stephen Metcalfe MP and Chi Onwurah MP. This day was packed with professional Society staff members and committees to find out the thoughts of MPs themselves and to make their opinions known regarding science, research, funding and teaching.

The opening was provided by Rt Hon John Bercow MP, Speaker of the House of Commons, as well as Chi Onwurah MP and Jo Johnson MP, Minister for Universities and Science. All three spoke about the importance of science and saw it as an integral part of the UK's future. Chi Onwurah MP, who was previously an electrical engineer for 20 years, held a particular interest in women in science and also the rewards and importance of transitioning from science to parliament.

The opening panel session was the first opportunity for the professional society bodies to answer questions and provide their opinions to the congregation of scientists, societies and MPs. The overarching title was 'The National Value of Science'. This included Rt Hon Liam Byrne MP who is the Shadow Minister for Universities, Science and Skills, Sarah Hartwell-Naguib who runs the House of Commons Library, Clare Viney from Royal Society of Chemistry, and Naomi Weir from the Campaign for Science and Engineering. Funding was a key issue across the panel, especially for science research; it was noted by all that the UK does punch well above its weight for relatively little revenue input, but this will certainly begin to fall behind when compared with China's science spending.

A keynote address was provided by Nicola Blackwood MP, who was recently elected the Chair for the House of Commons Science & Technology Select Committee. She was the first woman to be elected Chair of the Science & Technology Select Committee, which was a triumph in itself. Her speech echoed many sentiments previously expressed and vowed to ensure progressive change within the committee she now chaired. This was followed by the next panel session entitled 'The International Value of Science', which included Dame Jocelyn Bell Burnell from the Royal Society of Edinburgh. She echoed previous sentiments, but in particular she valued women in science and, more importantly, diversity. This, she found, was increasingly difficult with immigration being poorly managed and visas being near-impossible to obtain for scientists and students, resulting in very little input from non-UK citizens into science. Additional panel members included Dr James Larkin from the Royal Marsden Hospital, Hetan Shah from the Royal Statistical Society, Dr Chris Ryler from the Parliamentary office of Science & Technology and finally Chris Whitty from the Department of International Development.

Sir Venki Ramakrishnan, President Elect of the Royal Society, gave the closing talk for the day. He was a prime example of the many aspects that both panels had brought to light: the importance of funding into science education and research, as well as the ability to create a diverse work place so that skills from across the globe could be put to good use in the aims of furthering modern science. Overall it was an insightful day, which hopefully will provide the fuel needed for change.

Fiona Hatch would like to give special thanks to Stephen Benn for providing an invitation to the event.

Nicola Blackwood MP presents her keynote address to the attendees

2015 Forthcoming events

13 Nov

Life Scientists' Symposium - Modelling approaches in molecular signalling
Hodgkin Huxley House (H³), London, UK

www.yls2015.org.uk

2 Dec

H³ Symposium - Women's centenary event
Hodgkin Huxley House (H³), London, UK

7 Dec

H³ Symposium - Physiology, pathophysiology and future treatment options for diabetic complications
Hodgkin Huxley House (H³), London, UK

2016

29–31 July

Physiology 2016
Joint Meeting of the American Physiological Society and The Physiological Society
Convention Centre Dublin, Ireland

www.physiology2016.org

From the Archives

From the Archives: reports of the Cambridge and Oxford Meetings of 50 years ago

Transcribed by Roger Thomas

At the invitation of BHC Matthews a meeting of the Society was held in The Physiological Laboratory, Cambridge on the 22 May 1965.

With BHC Matthews and AL Hodgkin alternating in the Chair, 18 Communications were given, and between 11.45 a.m. and lunchtime, 13 Demonstrations including 4 extra ones, were shown.

In Communication number eight GS Brindley who, it was rumoured, had hoped to produce a rabbit from a hat, not only let a cat out of a bag but threw it into the air and, to thunderous applause from the Society, caught it again. *(Editor's note: The title of this communication was 'How does an animal that is dropped in a non-upright posture know the angle through which it must turn in the air so that its feet point to the ground?' The abstract concluded that it remembered its pre-drop orientation.)*

After dinner, which was held in the University Arms Hotel, Mary Pickford thanked the Chairman for yet again entertaining the Society so very well. BHC Matthews in reply redirected these praises to his colleagues and especially to Miss Sylvia Elton, and offered the Society's commiserations to those students for whom the Meeting meant only an unconstitutional examination on Ascension Day.

Signed GL Brown 16 July 1965.

At the invitation of GL Brown a meetings of the Society was held on the 16/17 July in the University Laboratory of Physiology, Oxford.

The meeting was preceded on the Friday morning by a joint colloquium with the Biochemical society on the Biochemistry and Physiology of the Central Nervous System when 6 invited speakers lectured to a very large audience in the Playhouse. After lunch the joint meeting divided briefly into three theatres for Communications, rejoined for tea and then shared 33 demonstrations, 23 from The Physiological Society and 10 from the Biochemists.

At 6.30pm the Society went its lonely way to Magdalen College to be generously entertained to sherry by the University in the Cloisters until GL Brown appeared on the roof to announce the dinners in Magdalen and Balliol Colleges. Since he prudently disregarded the invitation to 'jump for it', he was able, after dinner, to thank J Diamond who had proposed his health and The Society's thanks, for his possibly improper remarks about his former Professor and his certainly improper stories. He warmly welcomed the many distinguished foreign physiologists who were at the meeting and the Societies guests from the Biochemical Society. He explained that the labours of deciding with the Frank's Commission that Oxford was really quite a respectable University had thrown the main burden of arranging the Meeting on his colleagues especially onto RV Coxon and Audrey Richards.

On Saturday the meeting continued in two theatres with still more Communications until tea-time when, sated with a possible 33 Demonstrations and 63 Communications under the Chairmanships of GL Brown, HA Krebs, RA Peters and RV Coxon, controversy was stilled and one author offered *carte blanche* in the revision of his paper and Members welcomed DPC Lloyd's agreeable offer to JJB Jack that their discussions be continued later over the best possible dinner Oxford could provide.

Signed (in green ink, illegible but probably) DH Smyth.

Physiology 2015 experiences

The Editor, a graduate student and a post-doc report on their attendance at the Cardiff meeting.

Roger Thomas

Editor, *Physiology News*

Held in an arena designed for pop concerts with typically 5,000 rock fans, there was plenty of room for the Society meeting. The first of three days started with seven workshops, which were followed by seven symposia, and then seven sets of oral communications. These events were mostly held in a series of meeting rooms around the edge of the arena on the second floor. In the well-run symposium on astrocytes I learned that glycogen in the CNS is only found in astrocytes, and lactate is involved in signalling as well as supplying energy

To celebrate the centenary of the election of women members, all the public and prize lectures were given by women, starting with Sophie Scott of UCL talking about laughter (I restrain myself). Sophie is not a physiologist, but did include many fascinating facts, notably that laughter is one of few facial expressions recognised all over the world. Even rats will apparently laugh if tickled, and when tickled frequently will actually laugh in anticipation when the tickler enters the animal house. Not the normal reaction when physiologists enter! After the lecture there was a welcome reception in the arena. And plenty of wine.

Day two started with another seven symposia, after which there was a book launch. The book was 'Women physiologists: Centenary celebrations and beyond' edited by Susan Wray and Tilli Tansey. It is a glossy paperback of 170 pages, available from the Society at £5 a copy. The women featured range from the sadly late Alison Brading to the young Research Fellow Rachel Floyd. Most have a two page interview and a colour photograph. The book launch was followed by the Joan Mott Prize Lecture by Hannelore Daniel from Munich on Nutrients in the Gut. After that there was the AGM of the Society, started 5 minutes early as the President judged that there was a full agenda. He was right, the Chair from the home School (Ole Petersen) generally allowing only one question after each presentation.

The next prize lecture had to be given as a video, since Judy Harris was sadly indisposed. At the same time as this there were seven parallel sessions of Oral Communications, followed by the first of two poster sessions. Thanks to the size of the venue, there was for once plenty of room for each poster! After the poster session there was the Annual Review Prize lecture by Annette Dolphin of UCL on calcium channels and pain. The day ended with the Society Dinner in the National Museum. The drinks reception was in the upper galleries with a fine display of impressionists, while the dinner itself was in the magnificent main hall. Among the guests were Patricia Molina, the President of the American Physiological Society accompanied by her predecessor and successor. (She found the experience to be '...unforgettable. From the opportunity to sip champagne while perusing the lovely art collection, to the music, dinner, and collegiality amongst those attending. The highlight of the evening was getting to know David Paterson and Richard Vaughan-Jones on a more personal level during dinner'.) Diners were seated at circular tables and entertained by a live band. This required conversations to be conducted at a rather high volume. The meetings secretary, Ken O'Halloran, rounded off the dinner with a brief but witty speech.

The final day of the meeting started with another seven symposia, including a fascinating coverage of gaseous regulation of calcium homeostasis. According to one speaker, Matt Whiteman, hydrogen sulphide has a crucial role in controlling mitochondria, and offered novel therapeutic opportunities. He showed us a headline from a tabloid stating 'Scientists say sniffing farts could prevent cancer.' This was a consequence of an Exeter University press release stating 'Rotten egg gas holds key to healthcare therapies.' The final prize lecture was given just before lunch by Karin Sipido of Leuven on Calcium Microdomains in Cardiac Myocytes.

Sue Wray signing at the launch of The Society's Women physiologists book launch

Sophie Scott gives her lecture on the topic of the science of laughter

Lunch was followed by the second poster session and another five symposia. The meeting ended at 17.00. There had been a total of 115 symposium presentations, 77 oral communications, 282 poster communications, and 55 trade exhibitors, but unlike last year, no demonstrations.

Amelia Howarth

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I started my PhD in September of 2014 and, as such, had only ever been to a few internal symposia where I study, at the University of Edinburgh. A keen and avid learner of just about anything to do with science, I was looking forward to the Physiology conference and the new knowledge and new people it may bring.

Passing the initial 'Physiology 2015' sign, the first corridor was plastered with advertisements for bands and singers who would be performing at the venue, the Motorpoint Arena, later in the year. The rock and roll vibe was lost a little when we entered the man exhibition hall, where there were a few people standing about empty poster boards, chatting over cups of tea and coffee. I milled about a little on my own and before long it was time for the first workshop.

I'd chosen to go to a couple of the workshops and, with an interest in media, the 'Scientists say, but how do they know?' workshop was an obvious choice. Victoria Murphy from Sense About Science led a great discussion on leaping the gap between academic research and its appearance in the press. Victoria was bright and energetic about the topic and audience participation was rife, with people from all corners of the globe sharing their stories about working with the media. I was left with a lot to contemplate.

Inspired by the positive vibes I continued to my second workshop, 'Gender bias in publishing', where Sue Wray, editor-in-chief of Physiological Reports was fantastic and humorous, despite the slightly deflated atmosphere in the room. It seemed there was plenty of gender bias, but no consensus on how to solve it and the resulting feeling what somewhat disheartening. Acknowledgement of a problem, however, is the first step in solving it and I'm glad I went along. I learnt a lot and I'm grateful to be aware.

By 6.30, I was more than ready for the public lecture 'The Science of Laughter' being presented by the very charismatic Sophie Scott, from UCL. Did you know that during ten minutes of conversation, the average person laughs seven times? If you went to the public lecture, you probably did know that, and a lot of other blimps of interesting information gleaned from Sophie's laid back and amusing talk.

A moment of quiet before bed that night had me realising that, true to the conferences theme of '100 years of Women's Membership of The Physiological Society', most of the interaction I'd had that day were with strong women in science, and they had all been inspiring in their engagement and enthusiasm for their work.

The next day was equally as engaging, and I continued to be struck by the amazing representation of women at the conference. Sue Wray signed my copy of 'Women physiologists: centenary celebrations and beyond' and I gained invaluable advice from Hannelore Daniel, winner of the Joan Mott Prize, at her talk on nutrient transport in the gut – 'To all the youngsters, look a little bit into the antique literature... there is damn good science to be found!'. I continued to find myself surrounded by confident, independent, impressive female scientists and I decided that the 'Women in Physiology' theme had been a resounding success.

The Tuesday night of course also offered the conference-wide famous Society Dinner. We were greeted at the doors to the National Museum by smiling waiting staff with crisp, white shirts with seemingly unlimited glasses of champagne, who escorted us to one of the galleries where walls were full of art from the likes of Monet and Francis Bacon. My supervisor implored us to appreciate the Cézannes, but my eye was caught by a portrait of a nun sitting at a table, her hand resting on a bible, sporting the most mischievous smile I had ever seen in a painting, let alone on a nun – it's a shame I didn't catch the artist's name*. Dinner and networking followed and I couldn't keep track of all the people I was introduced to as plates of food sailed under my nose and wine flowed freely.

The next day was the day of my poster presentation and as I plastered up the A0 paper representing the last nine months of my hard work, I doubtfully listened to a wise and revered final year PhD student tell me that, often, poster presentations were the best bit of the conference. I was feeling a lot more chipper than a few of my colleagues after yesterday's late night, but lack of sleep had me feeling less than 100% and I prepped for the poster session with some trepidation, worrying that I'd suddenly forget what a cell was or how to say phosphorylation when talking to someone terribly important.

The reality was much different and the next two hours flew by as I chatted to people from all over the UK, from all levels of academia, who were actually interested in what I had to say. I work on purinergic signalling and I met more than a few purinergic enthusiasts, who helped to make the session engaging and encouraging and I ended it on a high, thinking perhaps the two hours was not quite long enough. The wise and revered PhD student was right and I wondered how I could have ever doubted her.

*Editor's note: The painting referred to is by Gwen John – *Mere Poussepin seated at a table*

Dominika Bijos

Young Urology Meeting
Organising Committee
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Physiology 2015, the annual main meeting of The Society, was, as always, a showcase of physiology research in the UK and worldwide. This was my fourth meeting: I was no longer nervous about presenting my poster. I already knew enough people to have someone to say hello to, and each year the Physoc meeting is a way to strengthen the connections and friendships I made a year earlier.

This year there was a lot of thought-provoking science. I didn't have a main thematic session that would anchor me to the meeting, so I ventured into new scientific fields and decided to explore what the meeting had to offer besides scientific sessions. My personal favourite were the general interest sessions with important discussions about publishing, the correct way of doing statistics, peer review, mentoring

and networking. I also re-discovered the Rob Clarke awards, where undergraduates present their research data, and I visited stands of exhibiting companies and talked new chemicals, animal models and equipment. On the last day I met David Miller from the History & Archives Committee. He added my name to the physiology genealogical tree: I am a scientific granddaughter of Alison Brading – an inspiring scientific grandmother to have.

Over the three days of scientific talks, fascinating discussions and hundreds of posters, the most important new connections I made were during the never ending follow-up chats late at night (science never sleeps!). Finally, I welcomed an earlier train home (sponsored by a train strike) in the company of fellow Cambridge colleagues. I know we will see each other again – once a physiologist, always a physiologist.

An appreciative audience cheers for Sophie Scott

Meeting Notes

qPCR Workshop

16–17 June, 2015,
King's College, London, UK

Chinedu Onwuchekwa

Usmanu Danfodiyo University,
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As I saw the notice about King's College, London's qPCR workshop in The Physiological Society's Newsletter in my email inbox, I told myself that this was what I needed for the next level in new laboratory research technique. The number of universities in my country with this type of capability is very limited, if not absent in terms of equipment and personnel. I applied and also asked my PhD supervisor, Dr Francis S. Oluwole, for a letter of support, which he kindly obliged to provide without hesitation. I was given a place for the workshop, and also a travel grant that I applied for was approved. After this, I headed to King's College London in the UK from Sokoto, Nigeria for the workshop. At the workshop, there were twenty other participants, of which there were three other Nigerians!

During the two days, Dr David Sugden and Dr Patricia de Winter co-chaired the workshop, with Dr Patricia Leoni and Caroline Pellet-Many providing excellent assistance. PCR and qPCR were exposited with the aid of multi-media. After this we were divided into groups of three for the practical work and the participants instructed to do-it-yourself. At the end of the workshop, the resource persons analysed the results from all the groups and scored the groups high in their performances.

I cannot thank The Physiological Society enough for the wonderful opportunity given to me to gain an invaluable qPCR experience.

(L-R) Doctors Odukanmi, Patricia Leoni, Nuhu Sambo and Chinedu Onwuchekwa

The participants listening with keen interest to Dr David Sugden and Dr Patricia de Winter

生理学: Studying the logic of life in China

An oriental view on what physiology is about

Denis Noble lecturing in Beijing 2008

Denis Noble

Department of Physiology, Anatomy & Genetics, University of Oxford, UK

Readers of *Physiology News* will surely not require reminding of the immense size, population and growing economic power of China. No economy in the world can ignore its impact now that it challenges even the economic power of the United States. Figures released by the Organisation for Economic Co-operation and Development show that China's investment in science and technology as a percentage of GDP (2.2%) has now overtaken that of the European Union (1.97%). Funding has therefore grown even more rapidly than the GDP.

The results are evident to us all in space exploration (and its physiology), high speed trains, supercomputing (also relevant to physiology), world class airports, convention centres – these are the outward signs. They represent the tip of an iceberg, the base of which is the most extraordinary success in bringing hundreds of millions out of rank poverty.

What of the inward signs, fundamental research, and physiology in particular?

As an honorary member of the Chinese Association of Physiological Sciences (CAPS) I visit China fairly often. As President of IUPS I have also interacted extensively on CAPS' plans for the IUPS World Congress in 2021. Even six years ahead that is a date to keep in mind. To judge from what I have experienced at their Annual Congresses it will be an intellectual feast as well as a feast in the more traditional sense. We all need to be more aware of the growth of physiology in China.

The reason is not just that our science is alive and flourishing there. It is also that the concept of what physiology means is subtly different. The centrality of our discipline in understanding life is written like a stone tablet in the Chinese characters used in their word for physiology. In sequence they are 生理学 : *Life-Logic-Study*. If your discipline is called the study of the logic of life how can you ever forget its central role?

Of course you can dig into the Greek origins of our word, physiology, and discover much the same meaning: It is indeed the study (*logia*) of nature (*physis*), but in English it doesn't stare you in the face in quite the same way as in Chinese. As a school student I had little idea of what physiology was about until I became a medical student at UCL. If I had learnt that it was the logic of living systems I would at least have realized its central importance. I remarked on this fact in a speech to a CAPS Congress recently and was greeted with enthusiastic applause.

What also struck me about the large audience filling the Congress hall was that over 80% of them were young. Only the few front rows were occupied by the older generation. Many in my generation would have suffered the privations of the 1966-76 Cultural Revolution, when most professors and young academics were sent to work in the fields. Universities were closed and most did not reopen until 1972. Those few that survived

From a visit to the famous Giant Wild Goose Pagoda in Xi'an with two eminent Chinese scientists. This is part of the original temple where the Buddhist sutras from India were first translated into Chinese at a time when Xi'an was the capital of China and was called Chang-an.

have been responsible for reaching out to the young in a remarkable revival.

It is as though, whatever catastrophes hit Chinese culture, it has a long tradition to which it can always relate. This is true of physiology as in other areas. The earliest medical texts go back well over 2000 years. Moreover the prescriptions in them are still used today. They are now being subjected to increasingly rigorous scientific and clinical investigation. Those who are inclined to dismiss this tradition as a collection of old wives tales should remember that a large fraction of the western pharmacopaeia owes its origin to natural products. As we search for medications that can address the complex medical problems of an aging population we may well find inspiration in the natural products from the East. Physiology is well-placed to do this since we are in the business of unravelling complexity, be it at the level of molecules, cells, tissues, organs or the whole body. The twenty-first century is already witnessing the return of physiology to centre stage, to evoke a theme of the 2013 world congress in the UK.

People sometimes ask me whether highly innovative work is being done in China. It is impossible in this short overview to answer that question fully. I will just highlight two examples. The first was a presentation to our 2013 Congress by Yonghua Sun at the Institute of Hydrobiology in Wuhan showing a remarkable result on cross-species cloning: the outcome is not uniquely defined by the genome. You can see the details in the subsequent article in *The Journal of Physiology*. The second is a fascinating development of a new treatment for blood cancer combining components from both western and traditional Chinese medicine developed by Zhu Chen at the Shanghai Institute of Haematology. You can view the extraordinary achievements of Zhu Chen on Wikipedia.

We also need to take note of Chinese physiology for another reason. We publish some of the best journals of physiology in the world. Every time I visit China I am asked by young scientists how they can achieve publication in top journals. My answer to them has always been a three-stage process: first get criticism from colleagues and revise carefully to let your article mature, then get the English checked, then just submit your papers. If your work is good and interesting you stand just as much chance as anyone else of getting published. Remember too that *The Journal of Physiology* is the oldest physiology journal in the world and has good impact. Many Nobel Prize winners have published in it. The journals of The Physiological Society have been international from their very beginnings.

References

Sun YH, Zhu ZY (2014). Cross-species cloning: influence of cytoplasmic factors on development. *The Journal of Physiology*, **592**: 2375–2379. DOI: 10.1113/jphysiol.2014.272138

http://en.wikipedia.org/wiki/Chen_Zhu

'Those who are inclined to dismiss this tradition as a collection of old wives tales should remember that a large fraction of the western pharmacopaeia owes its origin to natural products'

Collaboration in experimental science: AV Hill and the rise and fall of alphabetical author order in *The Journal of Physiology*

Do arguments from the 1930s resonate today?

Richard Boyd

Brasenose College,
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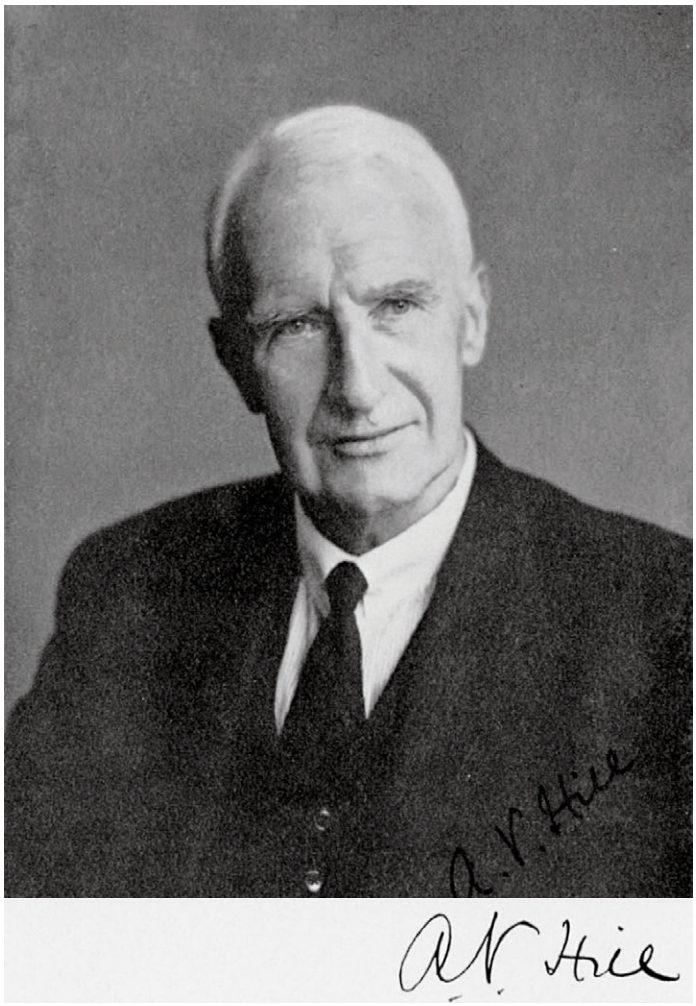
Harvard Medical School is one of many institutions that have a section on 'authorship guidelines' as a part of its public statement on Integrity in Academic Medicine. There is a section on 'the order of authorship' which states: *'many different ways of determining order of authorship exist across disciplines, research groups, and countries…order of authorship has no generally agreed upon meaning'.*

Despite this clear statement, many involved in modern biomedical research (whether as readers of scientific literature, as authors of published work or as appointment or grant panel members) assume that they 'understand' the 'significance' of the position of an author's name in a co-authored publication. But as the Harvard document makes clear: *'it is not possible to interpret from the order of authorship the respective contributions of individual authors…(so) readers should not read into order of authorship their own meaning which may not be shared by the authors themselves'.* Hence much confusion, bitterness and dispute continues, not least between scientific colleagues as co-authors (see e.g. Claxton, 2005; Wren *et al.,* 2007; Anon (editorial) 1997).

Nevertheless, joint publication thrives and now dominates much, and in some fields virtually all, of experimental science. There are many reasons for this. The most cogent, intellectually, is a point made with typical panache by PB Medawar ('the foremost biologist of his generation': Mitchison 1990). Medawar writes: *'The rationale of collaborative research is the synergism of two or more minds working towards the solution of the same problem, two or more people working together can accomplish more than the sum of what would have been possible if those same people had been working on their own: it is only in science…that this relationship obtains: it is not easy to imagine a novel being any better for having been written by two pairs of hands…More than that, colleagues enhance the satisfaction of having a bright idea or bringing a tricky experiment to a successful conclusion and they make the setbacks and the longeurs that are inevitable in scientific research much more supportable. Loners don't know what they are missing.'* (Medawar 1986).

The centenary of Peter Medawar's birth falls this year. Interestingly, although celebrated for his Nobel-Prize-winning studies on Immune Tolerance, Medawar (who died in 1987) saw himself as a zoologist but one who was very much the product of a 'physiological' training. As an Oxford undergraduate, he had JZ Young (of squid giant axon fame) as his tutor. He subsequently worked in the Oxford Department of the newly appointed Professor of Pathology, Howard Florey (another *physiologist-manqué*). And it was from this Department that he published, in *Experimental Physiology* (then the *Quarterly Journal of …*), his first scientific paper (Medawar 1937). Mitchison (1990) notes that, from then on when co-publishing, 'Medawar followed the uninformative but generous practice of listing authors alphabetically' as in his seminal paper with Billingham and Brent (Billingham, Brent & Medawar, 1953).



Understanding the origins of the alphabetical author order rule in *The Journal of Physiology* emerges from two sources. One source is the two letters written by AV Hill to Edward Sharpey-Schafer in January 1935 which were published only recently (Boyd 2012); the other source is from the (previously unpublished) Minutes of the Editorial Board of *J Physiol.* The first mention of the topic in these Minutes appears to have been at the Editors' meeting in Oxford on 14 July 1928. The four editors present were Sherrington, Leathes, Adrian and Hill. Item 9 reads: *'Alphabetical order in authors' names: Dr Adrian and Prof Hill reported that in respect of a recent paper they had asked the authors to put their names in alphabetical order, and they proposed to the Board that no exception should be allowed to the principle of the alphabetical order in the case of joint authorship. No decision was reached. It was decided to ask the Committee of The Society for guidance in the matter.'*

Hence the minutes of the next Editorial Board meeting (at University College, London on 13 October 1928) have, as 'matter arising, item f': *'Alphabetical order in authors' names: The Committee of the Society at their meeting in the afternoon was asked to express an opinion…The opinion of a large majority of the Committee was that alphabetical order should be adopted. In view of this a notice will be printed on the cover of The Journal requesting authors to place their names in alphabetical order'.*

For the previous fifty or so years, *The Journal* had allowed authors to choose the order in which their names appeared. These Editorial Board minutes provide the factual history of the process by which that altered. The changes remained in place for roughly the next 60 years, until the 1990s, by which time they had become contentious within The Society. The topic became divisive. Supporters of the alphabetical order rule were treated with some derision by many of the (then) bright young Turks (e.g. Roger Thomas, David Atwell) who saw themselves on the side of history in confronting the old fogies running *J Physiol.*

But what was the intellectual basis of the 1928 proposal? What emerges from the letters Hill sent to Sharpey-Schafer in January 1935 is that this was thoughtful, rigorous and principled. Selected parts of this correspondence are reproduced (from Boyd, 2012) below. [The relevant correspondence survives because Hill's successor to the Chair of Biophysics at UCL, Bernard Katz (who on this topic as many others was unambiguous in support of the 'Hill' approach: and who, as his masterly obituary of AV Hill indicates, was a scientific disciple of and follower of Hill's intellect and quantitative thinking) kept the copies which he found in Hill's files at UCL. It seems likely that the extent of Katz's support for the approach that Hill had adopted was such that the reversal of policy that ultimately did occur was possible only after Katz had left the Editorial Board.]

By 1935, Hill had become Chairman of the Editorial Board. Three key points arise in his response (7 January 1935) to criticism from Sharpey-Schafer who was seeking for the 'alphabetical order' rule to be reconsidered. The first is that: *'The Editors had had no reason to regret the new policy* [which overcame] *a chief objection to the 'other'* [that is non-alphabetical author order method] *where if n different authors do a piece of work together, then in order to demonstrate to the world that they are (in the words of the Athanasian creed) 'co-equal and co-eternal' they have to write not one paper on the subject but factorial n papers. If n=2 that is not so bad – it means only two papers; but if n=3 it means six and if n=4 it means 24, and if n=5 120 papers. That is the reason why American journals are so cluttered up with innumerable papers on the same subject by various authors with their names arranged in every possible permutation'.*

'All this nonsense about priority and seniority are very undignified and unfitting for a decent scientific society'

The second point, an important one, follows on from this: *'If the tendency to reduce the number of papers by n authors below the theoretical number of factorial n, the result is extraordinary jealousy between different authors, because if one fellow finds that his name does not come first at all....then he gets very jealous and a fight of some kind ensues. All this nonsense about priority and seniority is very undignified and unfitting a decent scientific society'*.

And then to the final point: *'You say that our plan of putting the names in alphabetical order is misleading: that is exactly what it is not. Everybody knows perfectly well that our authors are in alphabetical order – we say so on the cover – and therefore nothing can be deduced from the order (except that the Editors know the order of the letters in the alphabet)'*.

In a further follow-up letter to Sharpey-Schafer (10 January 1935), Hill re-emphases this point: *'You talk about our rule 'misleading' the public – that, as I said in my last letter, is precisely what it does not do. You can draw no conclusion whatsoever from the order of the names – it may not lead, but it does not mislead. The difficulty about leading is that leading is so often misleading'*.

Hill adds a personal context to the argument: *'I have adopted the method myself in all my papers for many years, and I have not noted that any harm has happened by it or that I have been charged with misleading the public. When Hartree and I have written papers the order of the names has been Hartree and Hill. It was quite unnecessary for me to rub in the fact that I had had perhaps a larger share in originating the work than Hartree had had.'*

And the comment that, in my mind, is still of interest: *'I know how much jealousy and trouble is caused in America by this question of the order of authors' name, and that we have eliminated at one blow by our actions... these personal questions ought to be eliminated from science; questions of priority and seniority are undignified and unworthy; even as matters are, with the alphabetical order all complete, the senior author is very apt to get much more than his fair share of credit anyhow and the junior less than his. There is no need to aggravate it by insisting on one's 'rights'*.

So why, by the 1980s, was the pendulum swinging strongly against this way of thinking? The dominance of North American science increasingly became the reality, in physiology as elsewhere; this could not be ignored. The empirical basis for a 'more pragmatic' perspective was exemplified in a particularly stark manner when the 'cost' to *J Physiol* of retaining alphabetical author order led, in 1963, to Hubel and Wiesel submitting their next series of papers, after their initial three joint papers in *J Physiol*, to the younger (and American) *Journal of Neurophysiology* (Wiesel & Hubel 1963) allegedly 'because Wiesel initially couldn't get tenure at Harvard because he hadn't a sufficient number of first author papers' (oral communication, Dr George Gordon). (What does this say about the then tenure committee at that institution and its apparent inability to comprehend revolutionary scientific discovery, a problem not shared subsequently by a certain committee in Stockholm!)

So what, as seen some thirty years after the abolition of 'alphabetical author order', can we tease out as the real issues? The sequencing of authors' names in joint publication remains unsatisfactory largely because of the scientific community's unwillingness to accept the point well-made (ironically by Harvard Medical School) and emphasised in my opening paragraph. Do we understand the meaning of an asterisk placed after one author's name telling us, in a footnote, that this individual is to be considered as 'joint second author'? This, now common, style hints at the arrival of an 'epigenetics' of authorship: information is coded in ways that remain murky and non-explicit, but somehow this code has contributed to the evolution of a sociology of scientific interaction. At times one senses that there may have been more wrangling between authors about what the asterisk signifies than discussion regarding the scientific content and clarity of presentation of their paper. We can be sure that, on this, the man who wrote with such great prescience that 'the difficulty about leading is that leading is so often misleading' would have been appalled.

Statement on Conflict of Interest: It should be noted that the author's surname begins with the second of twenty six letters

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A well-read edition of *JPhysiol* – note the alphabetical ordering for the authors

References

Anon (editorial) (1997). Games people play with authors' names. *Nature* **387**, 831

Billingham RE, Brent L & Medawar PB (1953).Actively acquired tolerance of foreign cells. *Nature* **172**, 603-606

Boyd CAR (2012). *Oxford Magazine* **325**, 10-12

Claxton LD (2005). Scientific Authorship Part 2. *Mutation Research* **589**, 31-45

Harvard University Medical School: Integrity in Academic Medicine (1999)

Katz B (1978). 'AV Hill'. *Biographical Memoirs of Fellows of the Royal Society* **24**, 71-149

Medawar PB (1937). A factor inhibiting the growth of mesenchyme. *Q J Exp Physiol* **27**, 147-162

Medawar PB (1986), 'Memoir of a thinking radish: an autobiography' Oxford University Press

Mitchison NA (1990). 'PB Medawar'. *Biographical Memoirs of Fellows of the Royal Society* **35**, 282-301

Wiesel TN & Hubel DH (1963). Effects of visual deprivation on morphology and physiology of cells in the cat's lateral geniculate body. *J Neurophysiology* **26**, 978-993

Wren JD *et al.* (2007). The Write position. *EMBO Rep* **8**, 988-991

Hundreds and Thousands: reflections on Physiological Society anniversaries

A thousand meetings and the Centenary of Women in The Society

Tilli Tansey

The Society's Honorary Archivist; Professor of the History of Modern Medical Sciences, Queen Mary University of London, UK

Centenary anniversaries are comparatively common. This year we not only have the 800th birthday of Magna Carta, but are also marking 200 years since Waterloo. And, of especial interest to those of us involved in medical practice or education, it is the bicentenary of the Apothecaries' Act which first standardised medical registration in the UK (superseded by the creation of the General Medical Council in 1858). Millenary* anniversaries are much more rare, especially within modern scientific societies. Here, The Society has a great distinction, having held one thousand scientific meetings. In fact it has by now held several more, although precisely how many more is difficult to estimate, as the date of the thousandth meeting is itself uncertain.

There can be few members of The Society who have failed to notice that this year marks the centenary of the election of our first women Members. I was invited to produce the Classical Perspective for *The Journal of Physiology* (Tansey, 2015) that outlined the careers and contributions of these six women members, all elected at the 1915 AGM.

In 1990, to mark The Society's seventy-fifth anniversary, the Society supported the book *Women Physiologists* edited by Lynn Bindman, Alison Brading and I (Bindman *et al.*, 1993). That volume included a review of the history of the events leading up to the 1915 decision, and brief biographies of the first six women members. It also included biographical accounts of distinguished women physiologists, with extracts from their scientific papers, selected and commented upon by later physiologists. Twenty-five years later a similar volume was published for Physiology 2015 (Wray & Tansey, 2015).

In 1994, I wrote to the then Committee Secretary, Jim Gillespie, to let him know that we would 'in the near future' be holding our thousandth meeting. The phraseology was deliberately vague because behind the question of 'when is the thousandth meeting?' lies the question 'what is a Physiological Society meeting?' There are three principal sources of information about meetings of The Society: The Society's Minutes Books from 1876, all preserved in the Archives; Edward Sharpey-Schafer's (1927) *History of the Physiological Society* (published to mark the fiftieth anniversary of the Society, and thus covering 1876-1926); and the published Proceedings that appeared in *The Journal of Physiology* from 1883 onwards; but these are not consistent and there are several gaps. For example, the first Minutes Book records all the early meetings of The Society but it is actually the fourth such meeting, on 26 May 1876, which is regarded as the inaugural meeting. Where do we start counting?

A second difficulty arises because pages are missing from the Minutes Books. There are two clear gaps - between the meetings of 18

'In 1994, I wrote to the then Committee Secretary, Jim Gillespie, to let him know that we would 'in the near future' be holding our thousandth meeting'

May and 12 December 1878, and between those of 13 November 1886 and 12 February 1887. The Proceedings published in *The Journal* fill in the latter gap, but not the former. By 1878, the regular pattern of meetings would suggest that there might have been a meeting in early December 1878.

For many years there were particular difficulties about accepting invitations to meet in Edinburgh because of personal differences between many Society members and Professor William Rutherford. WJ O'Connor has found evidence recorded in the *Brit. Med. J.* of an Edinburgh meeting in July 1890 that is not recorded in the Minutes Book, nor by Sharpey-Schafer, who apparently hosted in 1901 what is referred to as the first 'regular' meeting there (O'Connor, 1991). Of course, all the early meetings were social occasions only, some of them very poorly-attended (e.g. in November 1879 there were four members present and no business was transacted); some were grander affairs, such as celebratory dinners given for Mosso (1892), Cajal (1894) and Sherrington (1921). The second of these is recorded in the Minutes Book, the other two are not. Such inclusion or exclusion appears to be random, and not representative of a particular policy.

As I wrote in1994: *'Bearing all these (and other) discrepancies in mind (e.g. do International Congresses count?), my notes from the Minutes Books, the Proceedings, and the current meetings programme indicate that between 1876 and the end of 1994 there will have been approximately 966 meetings. At a rate of 7 a year, the millenary meeting should occur in 1999/2000. This is of course dependant on the criteria by which we judge what constitutes a 'meeting of The Physiological Society'.*

Sadly, but perhaps understandably given the shaky data, nothing further was heard of the matter. With the move towards fewer, larger meetings, it will be many decades, even centuries, before our daughter societies, the Biochemical, and British Pharmacological, Societies reach their own millenary events, and before we attain our second. We can now be confident that whatever the criteria used, The Physiological Society has held over a thousand scientific meetings - a remarkable achievement.

* Editor's Note: According to my OED, *'millenary'* refers to a thousand events or instances, *'millenniary'* refers specifically to the millennium, whereas *'millinery'* is old hat. (David Miller, no relation).

References

Bindman L, Brading A & Tansey T (eds) (1993). 'Women Physiologists: An Anniversary Celebration of Their Contributions to British Physiology', Portland Press

O'Connor W J (1991). 'British physiologists 1885-1914', Manchester University Press

Sharpey-Schafer E (1927). History of the Physiological Society during its First Fifty Years 1876-1926 (available at: physoc.org/society-history)

Tansey T (2015). Women and the early Journal of Physiology. *J Physiol* **593.2**, 347-350

Wray, S & Tansey, T (eds) (2015). 'Women physiologists: Centenary celebrations and beyond', The Physiological Society

Mabel Purefoy Fitzgerald (Figure 1)

The science and sagacity of Mabel Purefoy FitzGerald

A woman who went to great heights to reach her goals

Martha Tissot van Patot

Visiting Academic, Department of Physiology, Anatomy and Genetics, University of Oxford, UK

Mabel Purefoy FitzGerald (1872-1973) (Fig.1) was one of the first women admitted to scientific classes at Oxford. Her work in biomedical research led her from Oxford to Denmark, the United States, Canada and Scotland. She worked with Sir William Osler (1849-1919), JS Haldane (1860-1936), CS Sherrington (1857-1952) and other eminent scientists in a wide variety of fields including pathology, respiratory physiology, neurobiology, immunology and gastroenterology. She is most recognized for her contributions to our understanding of the control of breathing that arose from a solo research trip through the unruly mining towns of the Colorado Rockies.

FitzGerald however, also published important work in several areas of physiology, eventually becoming a clinical pathologist and lecturer at the University of Edinburgh. But, despite her eminence in research, her long-held ambition to study medicine was never fulfilled. In 1913, she became the second female member of the American Physiological Society, but only in 1973, when aged 100, a Member of The Society.

The daunting nature of investigating the FitzGerald archive at the Bodleian Library, thousands of documents jumbled chaotically (Fig. 2) into forty boxes spanning multiple generations of FitzGeralds (1645-1976), might explain why many of her contributions have not been previously brought to light. My recent forays into this archive have helped to reveal more about a fascinating woman of science.

Research

FitzGerald published eleven papers in twelve years (1902-1914, Table 1). Her first research position (in 1897) was in Oxford with Francis Gotch (1953-1913) and histologist Gustav Mann (1864-1921), where she developed an expertise in histology that was of enormous benefit throughout her career. Her histological work on tissue response at vaccination sites was included in a manuscript published by Mann in 1899. Mann was known for his intense working hours, sleeping only four hours per day, often on a mattress in his laboratory. Thus, Mann's letter of reference for FitzGerald commenting on her 'constant and unremitting study over the last seven years' gives insight into her remarkable dedication. Mann further states that he was 'so much struck by her great thoroughness that [he] proposed to her the difficult task of investigating the inter-relationship of the grey and white matter of the spinal cord of the monkey'.

The research on Macaque spinal morphology took five years and was communicated to the Royal Society by Gotch, but published under her name. This was the beginning of a trend established by FitzGerald's mentors, communicating her work to societies that often did not admit women as members,

'She rented a mule, hired a guide and set off to study the effect of altitude on $PaCO_2$, hematocrit and haemoglobin on men, women and children in some of the roughest high altitude mining towns in the United States'

FitzGerald MP & Dreyer G (1902). The unreliability of neutral red method, as generally employed, for the differentiation, of *B. typhosus* and *B. coli*. In Contributions from the University Laboratory for Medical Bacteriology to celebrate the inauguration of the State Serum Institute, ed. Salomonsen CJ. University of Copenhagen, *Copenhagen* **9**, 1-39.

FitzGerald MP & Haldane JS (1905). The normal alveolar carbonic acid pressure in man. *J Physiol* **32** 486-494.

FitzGerald MP (1906). An Investigation into the Structure of the Lumbo-sacral-coccygeal Cord of the Macaque Monkey (Macacus sinicus). *Proc R Soc Lond (B)* **78**, 88-144.

Fitzgerald MP, Whiteman RI & Strangeways TSP (1907). An Inquiry Into the Value of the Opsonic Index. *Bull Com Study Spec Dis* **1**, 115-144.

FitzGerald MP (1908). Three cases of the ringworm of the calf transmitted to man. *J Pathol Bacteriol* **12**, 232-241.

FitzGerald MP (1910). The alveolar carbonic acid pressure in diseases of the blood and in diseases of the respiratory and circulatory systems. *J Pathol Bacteriol* **14**, 328-343.

FitzGerald MP (1910). Preliminary Note on the Origin of the Hydrochloric Acid in the Gastric Tubules. *Proc R Soc Lond (B)* **82**, 346-348.

FitzGerald MP (1910). The origin of the hydrochloric acid in the gastric tubules. *Proc R Soc Lond (B)*, **83**, 56-93.

FitzGerald MP (1911). The induction of sporulation in the bacilli belonging to the Aerogenes capsulatus group. *J Pathol Bacteriol* **15**, 147-168.

FitzGerald MP (1913). The changes in the breathing and the blood at various high altitudes. *Phil Trans R Soc (B)* **203**, 351-371.

FitzGerald MP (1914). Further observations on the changes in the breathing and the blood at various high altitudes. *Proc R Soc Lond (B)* **88**, 248-258.

Table 1. Publications of Mabel Purefoy FitzGerald

but insisting she be the author on the publications. FitzGerald sectioned, stained, and drew to scale more than one hundred sections of Macaque spine so that she could quantify the anatomical structures (Fig. 3). This work brought her into contact with Nobel laureate Charles S Sherrington who noted that he was 'greatly struck by the thoroughness, untiring zeal, and truly critical spirit' of her research pursuits and goes on to say he was 'impressed with her earnestness for pursuit of enquiry into function throughout those of her researches whose formal method concerned itself mainly with morphological structure'.

FitzGerald had travelled to the State Serum Institute in Copenhagen (1901-1902) and worked with Georges Dreyer (1873-1934) (Fig. 4) to develop a more reliable method to detect *Bacillus typhosus* and *Bacillus coli* (reclassified as *Salmonella typhi* and *Escherichia coli*) in water supplies than was then available. In 1907, Dreyer was appointed the first professor of Pathology at Oxford. Interestingly, both investigators would go on separately to make important discoveries involving respiratory responses to high altitude hypoxia.

Back in Oxford (1905), FitzGerald began work with JS Haldane investigating the role of the partial pressure of alveolar carbon dioxide ($PaCO_2$) in health and disease. Haldane is noted for describing respiratory control by CO_2 and the 'Haldane effect', the increased ability of deoxygenated blood to carry CO_2. Interestingly, FitzGerald's work with Haldane began with determining normal $PaCO_2$ in men, women and children, which was unusual as most research at that time (and well into the future) was conducted exclusively on men. The first publication described $PaCO_2$ values in healthy subjects analysed by sex and age. This early experience may have led to FitzGerald's unique collection of data later made at high altitude that included men, women and children.

After establishing $PaCO_2$ values in health, FitzGerald and Haldane went into Oxford's Radcliffe Infirmary to record data from subjects suffering various 'blood, respiratory and circulatory' diseases. They reported that $PaCO_2$ was not significantly changed with lowered or raised haemoglobin in anaemic patients although breathlessness occurred with exertion. This led them to hypothesize that compensatory increased blood flow allows adequate oxygenation at rest. Finding normal $PaCO_2$ in pneumonia patients led them to conclude that blood must be shunted to the adequately ventilated

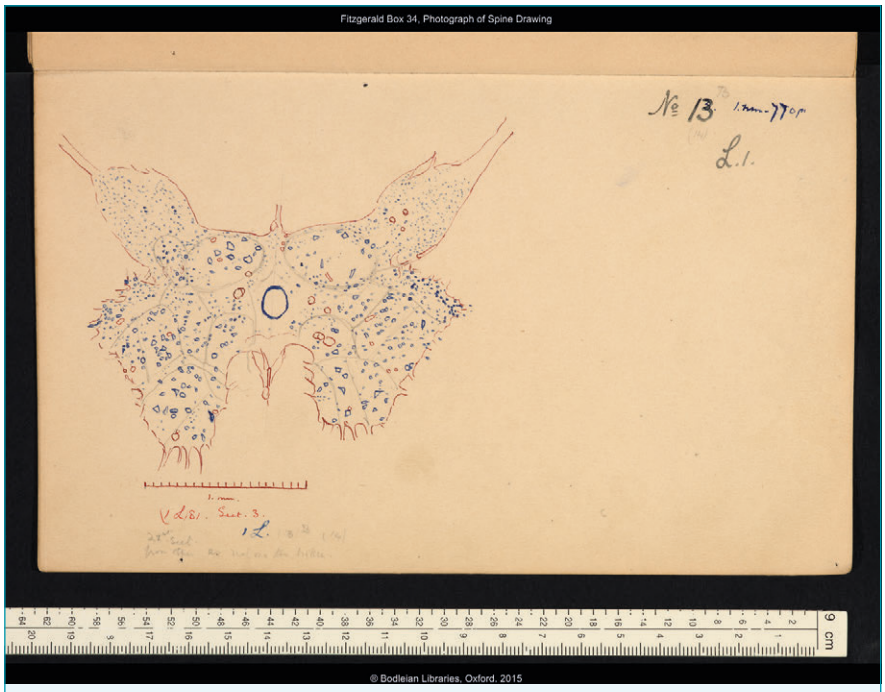

Figure 2. Scale drawing of a cross section of a Macaque Spinal cord

Figure 3. A box of documents in the Fitzgerald archive at the Bodleian Library

portions of the lung. They also noted there was no correlation between $PaCO_2$, haemoglobin or haematocrit. Because these findings were not published until after the Pikes Peak expedition, they further noted that the adaptations of circulation observed with disease were not adequate at high altitudes due to the lower oxygen saturation of haemoglobin there.

Over the next few years (1905-1908), FitzGerald attended clinical lectures and demonstrations at the Radcliffe Infirmary taught by the 'Father of Modern Medicine', Sir William Osler, Regius Professor of Medicine, and James Ritchie, a founder of The Pathological Society of Great Britain, with both of whom she developed lifelong friendships. Working with Osler and Ritchie, she published a manuscript describing a previously unknown parasite found in ringworm cultures.

Whilst working in the clinic, FitzGerald became frustrated with the opsonic index used to diagnose bacterial infection. She tested the validity of the index with Thomas Strangeways (1866-1926) at Cambridge. They reported on the problems inherent in obtaining reproducible results when counting a limited number of cells and extrapolating to a much larger population.

In 1907, FitzGerald won a Rockefeller Travelling Fellowship and went to New York to work with Hideyo Naguchi to develop methods of inducing sporulation in bacterial cultures. The two did not work well together. FitzGerald was a very careful and exacting bench researcher. By contrast, all of Noguchi's work was eventually disproved and colleagues suggest that his methods were not rigorous. For someone with FitzGerald's training, this was an insurmountable obstacle.

With the assistance of Sir William Osler, FitzGerald left Naguchi's laboratory and arranged to work at the University of Toronto with AB Macallum, Head of Physiology at the University of Toronto. Their resulting publication provided the first *in vivo* evidence of the origin of HCl in the parietal cells of the gastric mucosa. Testament to the valuable influence of this finding is the fact that this publication continued to be cited in 1972, the same year in which she turned 100 years of age.

FitzGerald returned to Oxford and was invited by JS Haldane to participate in the subsequently celebrated Medical Expedition to Pikes Peak, Colorado (1911) to study the effects of altitude on respiratory physiology. Once in Colorado, it was determined that it would be 'unseemly and potentially unsafe' for Mabel to stay high up on the mountain with the men. Undaunted, she rented a mule, hired a guide and set off to study the effect of altitude on $PaCO_2$, haematocrit and haemoglobin on men, women and children in some of the roughest high altitude mining towns in the United States.

The publications resulting from these studies eventually became the research for which FitzGerald was most recognized. She reported lowered $PaCO_2$, a result of greater ventilation, and elevated haemoglobin in acclimatized individuals. She found that these changes were a simple function of changes in altitude. Further, she recognized that oxygen saturation of haemoglobin - and thus blood oxygen content - were greater at altitude than barometric pressure would predict. She also recognized the approximate time frame (2 -4 weeks) for acclimatization, based on her own data, recorded throughout her travels.

FitzGerald criticized her own results for not including measurements between Sea Level and 5,000ft, a difficulty that plagues altitude researchers to this day. Therefore, in the summer of 1913, she went to North Carolina and obtained data from men and women at the missing altitudes (2,000 – 4,000ft). Her data revealed the same changes in $PaCO_2$ and haemoglobin as she previously reported at higher elevations. She noted that her own $PaCO_2$ values did not change with the more minor changes in altitude but that her haemoglobin rose. Recognizing that $PaCO_2$ was not responsible for the rise in haemoglobin, FitzGerald came tantalizingly close to hypothesizing the presence of a physiologic oxygen sensor. Remarkably, after 1915, she published no further scientific papers.

Education

By 1910, FitzGerald had already completed at least 900 hours of courses at Oxford and the University of Copenhagen that included physiology, histology, pathology, chemistry, and three years of clinical classes with Osler (Table 2). She applied to Cornell University Medical College, but was informed that she did not have the qualifications to enter medical school and advised: 'It would mean an expenditure of five years of time. At your age it seems doubtful that it would not be better to devote yourself to research...' (She was by then 38 and eventually lived to be 101 years of age.) FitzGerald promptly returned to Oxford to attend further classes that might qualify her.

‘She continued her quest to gain entrance to medical school upon arrival in Edinburgh, but was advised that she would find it difficult to attend the necessary lectures and practical work, whilst [she was] carrying on the duties of a Clinical Pathologist’

Figure 4. Fitzgerald and Georges Dreyer. Taken at the University of Copenhagen

FitzGerald returned again to New York in 1911 and attended at least another 800 hours of classes over the following four years in the attempt to meet the requirements for entrance into New York Medical School. By 1915, the time of her second application, she had completed at least 2000 hours of course work, 1600 of which were in the sciences, and had published eleven papers. Nevertheless, the authorities cited ‘poor algebra test scores’, and again denied her entrance. Shortly after this rejection, she was invited to be a clinical pathologist at the University of Edinburgh by her former clinical mentor, James Ritchie, now the Chair of Bacteriology and Superintendent of College of Physicians Laboratory. Mabel accepted and remained there as a clinical pathologist and teacher in the medical school until 1930 when she returned to Oxford to care for her ageing sisters. She continued her quest to gain entrance to medical school upon arrival in Edinburgh, but was advised that she would ‘find it difficult to attend the necessary lectures and practical work, whilst [she was] carrying on the duties of a Clinical Pathologist’.

On the flyleaf of all of her diaries, FitzGerald penned the motto: ‘If you can’t get want you like, like what you get.’ This is exemplified by her acceptance of a wide variety of research positions wherever they were available, her perseverance in producing a publication from each endeavour and developing life long friendships with her mentors and their families.

Acknowledgements

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Note: The Department of Physiology, Anatomy & Genetics at the University of Oxford has established an Annual Lecture series to be held in honour of Mabel FitzGerald, in connection with the Athena Swan programme.

Table 2. Secondary education of Mabel Purefoy FitzGerald

Class	Professor	Location	Hours	Year
Chemistry	WW Fisher	University of Oxford	84	1896
Practical Instruction in Chemistry	WW Fisher	University of Oxford	80	1897
Physiology: General and Nervous System	Francis Gotch	University of Oxford	70	1897
Histology: General, Physiological Chemistry, Experimental Physiology and Nervous System	Francis Gotch	University of Oxford	70	1897
Bacteriology	Georges Dryer	University of Copenhagen	175	1901
Experimental Pathology	Carl Julius Salomonsen	University of Copenhagen	72	1901
Pathology	James Ritchie	University of Oxford	72	1903
Practical Instruction in Pathology	James Ritchie	University of Oxford	64	1903
Spinal Pathology	James Ritchie	University of Oxford	72	1904
Bacteriology	James Ritchie	University of Oxford	24	1904
Clinical Lectures and Demonstrations	William Osler	University of Oxford		1905 - 1908
Opsonic treatment and methods	Sir Almroth Edward Wright	St. Mary's Hospital London		1906
Practical Instruction in Physics	ES Craig	University of Oxford	72	1910
Organic Chemistry	JE Marsh	University of Oxford	21	1910
Biological Chemistry	JE Marsh	University of Oxford	21	1910
Clinic for Skin Disease	Dr Bulkley	Clinic for Skin and Cancer Hospital		1910
Physics: Sound, light, magnetism and electricity	DW Herwig	Columbia University	30	1911
Advanced Biological Chemistry	William J Gies	Columbia University	144	1911
Latin	Unknown	Senftner Preparatory School	46	1911
Algebra	Unknown	Senftner Preparatory School	173	1911-1912
Physics	Unknown	Senftner Preparatory School	28	1911-1912
American History	Unknown	Senftner Preparatory School	34	1911-1912
English	Unknown	Senftner Preparatory School	50	1912
General Physics I	Unknown	New York University	30	1914-1915
General Physics II	Unknown	New York University	30	1914-1915
German Scientific Prose	Unknown	New York University	60	1914-1915
German Essay Narrative Prose	Unknown	New York University	30	1914-1915
Politics City of New York	Unknown	New York University	60	1914-1915
Italian - Intermediate Course	Unknown	New York University	60	1914-1915
Modern Questions in International Politics	Unknown	New York University	30	1914-1915
Italian - Advanced Course	Unknown	New York University	30	1914-1915
Surgical Anatomy	J Ryland Whitaker	University of Edinburgh	160	1916-1917
Practical Anatomy	J Ryland Whitaker	University of Edinburgh	240	1919-1921
Summary (Hours are less than those actually attended due to missing information, particularly for clinical courses)			2132*	25 Years (Ages 24 - 49)

References

Oxford University, Bodleian Library, Mabel FitzGerald Papers (uncatalogued).

Goodman M (2014). The high-altitude research of Mabel Purefoy FitzGerald, 1911–13. Notes and Records: the Royal Society Journal of the History of Science, rsnr20140061.

O'Connor WJ (1991). British Physiologists 1885-1914: a biographical dictionary. Manchester University Press

Reeves JT & Grover RF (2001). Attitudes on Altitude: Pioneers of Medical Research in Colorado's High Mountains University Press of Colorado, Colorado.

Torrance R (1999). Mabel's normalcy: Mabel Purefoy FitzGerald and the study of man at altitude. Journal of *Medical Biography* **7**, 151-165.

West JB (2012). Centenary of the Anglo-American high-altitude expedition to Pikes Peak. *Experimental Physiology* **97**, 1-9.

'Isomorphogenesis No.2' © Gemma Anderson, 2014.
Watercolour on paper. **www.gemma-anderson.co.uk**

This artwork is part of a series created through interaction with a drawing based algorithm. Anderson is an artist and researcher who has been collaborating with John Dupré since 2012 and this series has been inspired by Dupré's 'Process Philosophy for Biology' ERC project

A process ontology for biology

Functions are just fast processes and structures are (relatively) slow processes

John Dupré

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Most philosophers, if asked what they took to be the most general way of describing the world, living or otherwise, would refer to an inventory of things and the properties that characterise them. The former may be simple – atoms – or complex, composed of other things. The latter may pertain to individual things, or they may involve relations between things. However the idea that a true description of the world will say what things there are and what their properties are is a natural and plausible one.

This ontology of things and their properties is articulated at a higher level through the concept of mechanism, the arrangement of things into structures that, by virtue of their various properties, interact resulting in overall function. This concept has undergone a resurgence of interest in recent philosophy, reflecting the important role it plays in practitioners' conceptions of the aims of scientific research. It is open to question, nonetheless, whether the concept of mechanism plays a substantive role in guiding research rather than merely a rhetorical one in promoting it.

There is, at any rate, an alternative ontology, one generally attributed in antiquity to Heraclitus (535 – c. 475 BCE), that takes things themselves to be only temporary manifestations of something more fundamental, change, or process. As Heraclitus put it, 'There is nothing permanent except change'. On such a view what we think of as things are no more than eddies in the constant flux of process. In the last century, this perspective was forcefully advocated by the philosopher Alfred North Whitehead (1861-1947), and his ideas had a strong influence on a number of biologists including Conrad Waddington (1905-75) and JS Haldane (1860-1936). Despite subsequent decline in interest in process philosophy, I want to claim that an ontology of processes is far better suited to understanding the nature of life and the living than the more standard ontology of things.

What it is that makes something a kinase, a liver, or a turtle? And hence also, what it is that determines whether an entity persists despite changes that it undergoes. Both questions have traditionally been answered by appeal to an essential property or properties, characteristics that are necessary and sufficient for something to be, say, a turtle. But as many philosophers have noted, the fact of evolution makes the postulation of any such properties problematic. Moreover, even if there were some property sufficient to define something as a turtle, could we be confident that the same property would apply to the turtle's egg? The life cycles of organisms include very different forms; why assume there must be anything common to every stage beyond their participation in a continuous process? The plasticity of development and the robustness of metabolism, its independence of a precise sequence of molecular details, can also raise similar questions for the parts of which organisms are composed.

A central consequence of switching from a thing to a process perspective is the following: When viewing an entity as a thing, what require explanation are the changes that occur to it: the default condition for a thing is stasis; change can raise a question whether the thing has persisted at all. But the default for an organism is not persistence but death. Many thousands of changes must happen every second in every cell for it to persist in a healthy state. This is obvious merely from the familiar observation that life exists far from thermodynamic equilibrium. Physiology does not investigate the properties of a stable object, but the processes that enable a system of some kind to retain its form sufficiently for it to continue to function. Medical science, similarly, concerns the many ways in which these processes can fail. In *The Selfish Gene*, Richard Dawkins perspicuously described natural selection as a special case of the more obviously tautological survival of the stable. The insight can also mislead, however. The survival of an organism is a very different matter from the survival of an iron atom.

A further advantage of the process perspective is that it sidelines questions about the boundaries of biological entities. Where does the river stop and the eddy begin? Living systems comprise of a hierarchy of deeply intertwined processes, processes that are shaped by both higher and lower level processes with which they are connected. The process perspective enables us to see that answers to such questions are to an important extent matters of convenience rather than of fact.

None of this, of course, is to say that living systems are undifferentiated mush. For an organism to persist, a multitude of discontinuities must be maintained between its parts. The functions of these discontinuous parts provide the central question for physiology. But like the boundaries of a whirlpool, even these discontinuities are very much part of the dynamics of the system. A membrane, for example, is not just a barrier that keeps parts separate one from another. Rather, it is a highly active system or process, expending energy to maintain molecular discontinuities of many kinds between its two sides. The cell itself is maintained as a temporarily stable system both by this dynamic relation to its external environment, and by the countless metabolic and other processes that are happening on its interior.

The question of boundaries has recently surfaced in intense philosophical debate about the nature of biological individuals, or organisms. It has become increasingly clear that symbiosis is omnipresent in the living world. Are mutualistic bacteria in the human gut parts of the human system or just fellow travellers? Given that many of them seem essential for our well-being, what is the criterion by which we deny that they are parts of the human organism? Are there sharp distinctions between mutualism, commensalism, and parasitism? From the point of view of intertwined and interdependent processes, no obvious importance attaches to these labels, though of course we will often want to know whether a particular associated organism is necessary for or harmful to our well-being.

I mentioned the traditional association of physiology with the analysis of function. However, a further issue that is potentially transformed by a processual perspective on living systems is the distinction between structure and function. It is common to think of biological objects having particular structures that enable them to perform particular functions. But if these 'objects' are in fact constantly fluid and evolving processes, this perspective can be misleading. Structure and function are intertwined aspects of process. Or perhaps, as was suggested by the founder of General Systems Theory, Ludwig von Bertalanffy (1901-1972), functions are just fast processes and structures are (relatively) slow processes.

Good illustrations of such a view come from plant development. The growing meristem of a plant is typically an opportunistic growth process capable of producing a variety of structures – leaves, flowers, roots – in response to the environment it encounters. These putative structures are traditionally understood as distinguished in virtue of their particular functions – photosynthesis, attraction of pollinators, absorption of nutrients, etc. – they serve. But the attempt to distinguish sharply between these traditional morphological elements is often problematic. One often encounters claims such as that the colourful bracts of Bougainvillea, or the spines of a cactus, are really leaves. But given the totally unrelated functions and structures of these entities, and the general plasticity of plant development, it is hard to make sense of such claims. Better, perhaps, to say with JS Haldane in his 1931 book, *The Philosophical Basis of Biology*, 'structure and functional relation to environment cannot be separated in the serious scientific study of life, since structure expresses the maintenance of function, and function expresses the maintenance of structure', it should be unsurprising, I suppose, that physiology and morphology are in the end just different perspectives on the same underlying phenomena.

Or consider proteins, the paradigmatic examples of biological entities for which structure has been assumed to determine function. This simple structure/function analysis has been increasing stretched as it has been found that many proteins serve a range of functions ('moonlighting' proteins); that many or most proteins do not have a fully determinate structure ('intrinsically disordered' proteins); and that the interaction between an enzyme and the molecule with which it interacts, does not really fit the traditional 'lock and key' model, but rather involves a considerable amount of mutual configuration. All of these phenomena fit better into the view of the protein molecule as a dynamic entity, the causal powers of which are constantly being reconfigured in relation to the processes in which it participates, than into the classical model of a thing with a fixed nature that determines once and for all what it is and what it can do.

I would summarise much of the foregoing discussion by claiming that both structure and function are ultimately best seen as abstractions from underlying process. Descriptions in terms of structure abstract from the crucial temporal dimension of living processes, as well as selecting non-arbitrary but underdetermined spatial limits for the objects of interest. Function brings back the time dimension, but at a cost of focus on an increasingly specific set of properties of the entities under review. Distinguishing biological mechanisms involves abstractions of both kinds.

Does this kind of broad philosophical analysis matter much for practising scientists? In the end I must leave it for them to answer. I would suggest, however, that it may have the potential virtue of replacing a certain kind of excessive concern with realism with a more defensible pragmatism. No one has any prospect of providing the complete truth about a living system; particular models are provided with particular goals for insight or intervention. It is vital to be aware of the limitations imposed by particular abstractions in model building, but equally important not to mistake limitations for objections. This may be a particular important reminder for the emerging field of systems biology.

Further reading

Dupré J (2012). Processes of Life: Essays in the Philosophy of Biology, OUP

Seibt J (Fall 2013 Edn). 'Process Philosophy', The Stanford Encyclopedia of Philosophy, Edward N. Zalta (ed.), <http://plato.stanford.edu/archives/fall2013/entries/process-philosophy/>

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The Physiological Society

Nature and nurture: a journey through science and publishing

Exploring science beyond academia

Lesley Anson

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Like many scientists, I suspect, I've always considered myself lucky in that I'm paid to do my hobby. I'm not a practising scientist any more, but as a scientific editor, I remain deeply immersed in the world of scientific endeavour and, in particular, its communication to a wide audience. I'm often asked about the route I took and the decisions I made to become an editor. But in truth, my career has evolved organically thanks to a handful of influential mentors, a dose of gut instinct and a little bit of luck.

It was at the University of Newcastle upon Tyne where I first experienced the thrill of scientific research whilst a physiology undergraduate. Lectures were held in the very centre of the department, so we were literally surrounded by laboratories where PhD students and postdocs could be seen beavering away on their experiments. It was in these laboratories where we were to taste what life was like as a working scientist during our final year projects and, in my case, a vacation project funded by The Society under the watchful eye of Jim Gillespie (and The Society's dog – Jim was Society Secretary at the time). In this stimulating environment, I discovered that scientific research was fun, interesting and, crucially, something that seemed achievable.

As I was finishing my BSc, I became excited by the prospect of measuring current flow through individual ion channels in real time using the then recently-described patch clamp technique. So I contacted as many people as I could find in the UK who were 'patching' to ask if they'd consider taking me as a PhD student. To my surprise and delight, I received several positive responses, and eventually chose to work on an innovative project on cochlear inner hair cells with Jonathan Ashmore at the University of Bristol. Jonathan's enthusiasm for science was infectious, and with the support of a very active department whose coffee room formed its pulse, I graduated as an independent thinker after three very enjoyable (and challenging) years.

During the course of my PhD studies, I used patches of membrane containing NMDA receptors as a bioassay for glutamate. So when a postdoctoral opportunity arose to study these channels at the most precise biophysical level imaginable (at that time), I seized it, and joined David Colquhoun's laboratory at University College, London. This was what I had dreamed about – spending my days recording and analysing conformational changes in single molecules. But two papers were published during this time that greatly influenced my next career move: the first high-resolution structure of an ion channel (Doyle *et al.*, 1998) and, soon after, the structure of the ligand binding domain of a glutamate receptor (Armstrong *et al.*, 2008). At the time, I was already looking at alternative careers in science, having realised that running a lab wasn't readily compatible with starting a family. But these two papers opened my eyes to the brave new world of membrane protein X-ray crystallography and also the thrill of reading the kind of landmark paper that significantly influences thinking in a field. Shortly after, I left the lab to pursue an editorial career at *Nature*.

In the years that followed, I became immersed in manuscripts describing other people's endeavours from fields as diverse as chronobiology, synaptic physiology and, naturally, ion channel biophysics. I filtered, peer-reviewed and accepted for publication numerous papers that were, in my opinion, landmarks in their field. Not a day passed when I didn't feel the buzz, and the responsibility, of handling some of the best science being done at the time. The job was varied, which meant that I could be writing copy for the journal in the morning (Anson 1999, 2002, 2006), and engaging with a reviewer about the technical aspects of a manuscript in the afternoon. I learned about a great many more fields of science than I'd ever imagined I would and, most excitingly, I became embedded in the membrane protein biophysics field during one of its most exciting times and added structural biology to my dinner conversations. Although I was not practising science myself any more, I was able to engage with scientific progress in what felt like a meaningful way.

Of course, being a print journal, there was a limit to the number of papers that *Nature* could publish every week, and it was a genuine shame to have to reject many wonderful manuscripts. So when the publishers decided to launch a new, online-only journal to complement, but not compete with, the other *Nature* journals, I began work on building what was to become *Nature Communications*. The goal of this new journal was to publish important pieces of work, following rigorous peer review, that wouldn't necessarily have the kind of broad appeal that papers published in other *Nature* journals had. And it seemed that there was an abundance of such papers across the natural sciences – so much so that in five short years the journal grew to publish more than 300 papers a month, swelled its editorial staff to 40 and received an Impact Factor of 11.47. I had landed myself with the most exhilarating Chief Editor role imaginable. I discovered how rewarding it could be to manage a team – watching scientists grow into scientific editors was most gratifying – and act as a mentor for new managers. I also experienced The journal change to an open-access business model and participated in debates and interviews about open access, including on BBC Radio 4.

As I write, however, I am embarking on an exciting new chapter in my career as a freelance scientific editor and publishing consultant, which will bring me closer to the community from which I originated. I will be helping scientists to write research papers in a clear, concise and impactful way; providing advice about communicating with editors and referees through cover letters and responses to referees; and developmentally editing review articles to maximise their accessibility. I consider myself privileged to have accumulated the skills and experience to do this by working for some of the best scientists, universities and journals in the world and very lucky to do what I enjoy for the community that shaped my career.

References

Doyle DA *et al* (1998). The structure of the potassium channel: molecular basis of K^+ conduction and selectivity. *Science* **280**, 69-77.

Armstrong N, Sun Y., Chen G-Q & Gouaux E (1998). Structure of a glutamate-receptor ligand-binding core in complex with kainate. *Nature* **395**, 913-917.

Anson L (1999). Ion channels: common origins. *Nature* **402**, 739.

Anson L (2002). Neurobiology: the bitter-sweet taste of amino acids. *Nature* **416**, 136.

Anson L (2006). Physiology: channelled pain. *Nature* **444**, 156.

'Although I was not practising science myself any more, I was able to engage with scientific progress in what felt like a meaningful way'

More than just a muse: women writing science

Today, new scientific discoveries are all over the news and the field of science communication is gaining popularity by the hour. But science communication isn't just a by-product of modern society. In fact, its roots can be traced back several centuries ago

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'There walks the man who lectures to the walls' – this was a comment made by two of Isaac Newton's students, making reference to Newton's infamous lecturing skills, which apparently were so terrible that none of his students ever attended his lectures and he was left talking to the walls.

Isaac Newton was not interested in good communication, and his ideas became widely known thanks to his followers, who translated, simplified and communicated them. It took many years for his ideas to be accepted.

Science needs to be communicated, and while the scientific world remained a place mainly reserved for men up until the modern days, women have nevertheless contributed to important scientific discoveries, as well as played a crucial role in communicating science, throughout history. Michael Faraday, for example, was so inspired by Jane Marcet's 1805 book, *'Conversations on Chemistry, Intended More Especially for the Female Sex'* that it prompted him to devote his life to science.

One of the most important women scientists and communicators and populariser of Newton was Émilie du Châtelet (1706-49), a French mathematician, physicist and author, who contradicted the belief that you cannot be both a women and a scientist. Her motto was to enjoy life and yourself, on a scientific as well as private level.

Together with her then lover Voltaire, she wrote '*Elements of Newton's Philosophy*' (*Élements de la philosophie de Newton*, 1738), which was amongst the most influential works about Newton. Although the book only names Voltaire as the author, he fully acknowledged her immense influence and contribution.

Émilie continued writing books, and probably her most important piece was a two-volume translation of - and commentary on - Newton's *Principia (Mathematical Principles of Natural Philosophy)*. To this day, her work is the leading French translation, as well as the only complete translation of Newton's book. In addition to translating it from Latin into French, she also provided a long commentary, which explained, challenged and discussed his ideas, and provided long footnotes with updates on recent research.

Another famous communicator was Mary Sommerville (1780—1872), the 'Queen of sciences'. She translated Pierre-Simon Laplace's book, *Mécanique céleste*, and wrote many of her own books in which she explained and interpreted the latest scientific ideas.

But how and why did early women scientists use writing to further their careers, and how were they limited by their sex?

In Georgian times (and earlier), home science and family projects were fairly common and a good opportunity for women to get involved with science. But with the increasing importance of qualifications in the 19th century, it became more difficult for women to enter into science. As a consequence, many women turned to science writing and popularising, which would allow them to stay involve with science. Moreover, the more scientific publishing expanded, the bigger the gap between academic and popular science writing became.

Elizabeth Brown (1830-99), for example, was introduced to astronomy by her father. It was only after his death that she actively started travelling to record her observations. She wrote many books on that matter, and had active roles in astronomical societies.

Agnes Mary Clerke (1842-1907) was home tutored, received university education through her brother, and became one of the most successful popularisers of astronomy in the 19th century.

Expectations were different for women than for men; it was favourable for women to possess a sound but fairly general and superficial knowledge. Only a few women attended university. Constance Herschel (Constance Anne (née Herschel), Lady Lubbock, 1855-1939), granddaughter of astronomer William Herschel, grew up

surrounded by science and was one of the first women who went to Cambridge. Her letters point out gender inequalities in university education, but she finished her studies and continued in research until she got married and had children. Once her children were older, she started writing popular science.

Interestingly, subjects like maths and astronomy were very popular topics for women to research and write about (scientifically as well as popular writing), as these disciplines were more accessible and acceptable for a woman to pursue. Women could carry out calculations within the walls of their homes and were not dependant on a lab to get results. Before introduction of the Linnaean system, botany also was a very popular research topic amongst women[1], but after Erasmus Darwin's 'The loves of the plants'[2] it was no longer deemed acceptable.

In spite of family commitments, reservations and lack of education, women have carved out a niche that enabled them to work in the field of science. It would be interesting to see if the reason why many women leave research nowadays has the same underlying motivation that women in past times have experienced, or if it is simply because communication and education are (perceived) as a more feminine trait?

The article is based on the event 'Women writing science', held on 10 March 2015 at The Royal Society, where historians Dr Patricia Fara, Dr Emily Winterburn and Dr Claire G. Jones explored the history of women publishing in journals, writing popular science and corresponding with the Royal Society. ***https://royalsociety.org/events/2015/03/women-writing-science/***

In the frontispiece to Voltaire's interpretation of Isaac Newton's work, Elémens de la philosophie de Newton (1738), the philosopher sits translating the inspired work of Newton. Voltaire's manuscript is illuminated by seemingly divine light coming from Newton himself, reflected down to Voltaire by a muse, representing Voltaire's lover Émilie du Châtelet—who actually translated Newton and collaborated with Voltaire to make sense of Newton's work.

Image source: **http://hsci.cas.ou.edu/galleries/18thCentury/Voltaire/1738b/Voltaire-1738b-000fp-image/**

References

[1]Henderina Scott (1862-1929) - Botanist and Filmmaker created pioneering slow motion animations and demonstrated time-lapse films about plant development; Edith Saunders - Botanist; Marie Stopes – Palaeobotanist.

[2]Browne J (1989) Botany for gentlemen: Erasmus Darwin and 'The Loves of the Plants'. *Isis* **80**, no. 4: 593-621.

Our membership: past, present and future

All change on membership

Michael Evans

Keele University, UK

As the outgoing Chair of the Membership and Grants Committee I have been asked to write a few words on the state of our membership, including some retrospection given the focus of this 100th edition of the magazine. This is very timely, given the recent expansion of our membership and the current debate about having a new Fellowship category within the Society, as initially mooted in the 2011 Membership survey.

We currently have just over 3,500 members, comprising full members (55%), affiliates (31%), undergraduates (11%), honorary members (2%) and associates (<2%). In May we admitted our 3,500th Member, David Holdsworth from the University of Oxford. Over the past year our numbers have been growing - by 10% since June 2014. We put this down to a recent drive to place membership at the top of our list of priorities. The new customer resource management (CRM) computer system, which will be put into place later this year, will only improve matters and will allow members (including a growing number of overseas members) greater access to Society information and improved communication. It will also improve our ability to update the member directory on the website, something we know members are concerned about.

Looking back over the past 139 years since the beginning of the Society, and over the 100 years since its membership was opened to women, one can say with some emphasis that we represent a lively, inclusive and relevant Society, and one that will continue to attract new members. In this respect it is vital to stress the importance of our undergraduate and affiliate categories, the full members of tomorrow. We hope the CRM will aid in a seamless transition to the next membership stage for our early-career members. There is an increasing (some would say belated) realisation that many of our prize speaker lists are populated principally or even wholly by men, and we are trying to redress the balance. However this also depends on women being nominated in the first place, so please bear this in mind. (This does seem to be a prize speaker phenomenon, if I can put it like that, since women are well-represented in other aspects of Society life, membership and work).

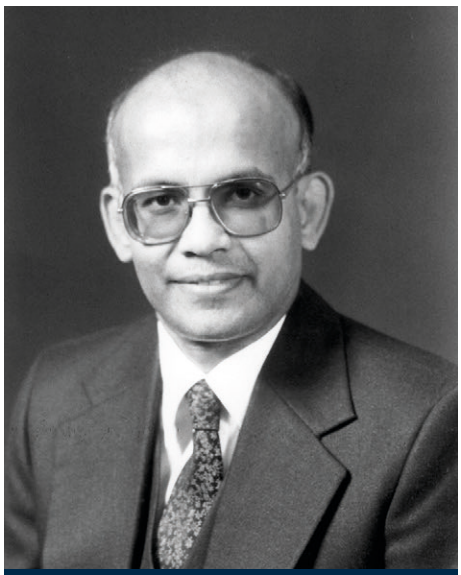
This brings me onto the new Fellowship category, currently being discussed by a recently convened working group. The broad intention is to reward, acknowledge and help publicise outstanding contributions to physiology or The Society, including its charitable objectives. A hoped for consequence of this would be to help in the career progression of members. As such it is currently viewed as distinct from honorary membership, which can include non-members and Nobel laureates.

Our membership has indicated that what they value most about The Society is the promotion of physiology, the ability to network with other scientists at meetings and to apply for travel grants to attend meetings. Thus the fee structure of the membership categories, reviewed annually, is closely associated with the respective travel grant levels, currently £700 for members, £500 for affiliates and £100 for undergraduates. What are the membership issues looking ahead? We must continue expanding our membership base from undergraduates upwards, provide a quick and helpful interaction with members, and improve lines of communication and information through the various channels including *Physiology News* and our website. Our Society Representatives and Theme Leads are also vitally important in achieving these goals, and we need to improve support and increase engagement in both directions. The work continues.

Should you have any views on any aspect of your membership or on the new Fellowship category, please send them to membership@physoc.org

I would like to finish by thanking my fellow committee members, including Rachel Tribe as the incoming Chair, and Society staff, Helen Burgess, Nick Boross-Toby and Casey Early for their unstinting support, guidance and enthusiasm.

Obituary:
CT Kappagoda 1943 – 2015



Professor CT Kappagoda

HM Snow

Adjunct Professor,
Department of Physiology
University College, Cork, ROI

Professor CT Kappagoda died on 28 January, 2015, aged 71, in Sacramento, California. Tissa Kappagoda was Professor of Medicine in the Division of Cardiovascular Medicine at the University of California, Davis. He qualified in Medicine at the University of Ceylon in 1965. In 1966, he moved to England, where he held junior hospital appointments in the National Health Service before joining the Cardiovascular Unit in the Department of Physiology at Leeds University. The unit, which had recently been set up under the direction of RJ Linden, combined basic science and clinical cardiovascular investigators within one group. His PhD thesis was on the function of atrial receptors. Specifically, he examined the reflex pathway of the diuresis in response to stimulation which, in the early seventies, was considered to be both hormonal (ADH) and neural. However, after elimination of both hormonal and neural components, it was still possible to obtain a diuresis and it was concluded that there exists an - as yet - unidentified diuretic hormone.

Kappagoda's intellectual and experimental input to these experiments was immense. He and I collaborated on several projects and he became a valued friend. I shall never forget his great technical skill at finding atrial receptor single unit activity in the cervical vagus and he could always be relied upon to complete that most difficult task of producing a first draft of any paper. The results of all these experiments were written up in a series of papers in *The Journal of Physiology* and *Experimental Physiology* as well as in The Society's publication, Atrial Receptors, (with RJ Linden). At the same time, investigations of clinical relevance into methods of the assessment of acidaemia and its cardiovascular effects were carried out. Kappagoda also developed a novel open-circuit method of measuring oxygen uptake during exercise which was used to assess the effects of exercise in patients with ischaemic heart disease.

After leaving Leeds in 1978, Kappagoda was appointed Research Professor of Medicine and Director of Cardiac Rehabilitation at the University of Alberta in Canada. Here, he quickly established a team of research assistants working on both clinical and basic cardiovascular physiology such as the function of pulmonary receptors in heart failure and the effects of exercise training in ischaemic heart disease. The success of his work at the University of Alberta led to his final appointment as Professor of Medicine, Division of Cardiovascular Medicine, at the University of California, Davis and Director of the Preventive Cardiology Programs at the University of California Medical Center. Here, his research focused on the role of endothelial cells in regulating vascular tone and the effects of fatty acids and polyphenolic products present in plants in human and animal models. All this work is of particular relevance to patients with Type 2 diabetes and atherosclerosis.

Throughout his career many research fellows had the privilege of collaborating with, or being supervised by, him for their doctoral theses. Too many to be listed here, we all gained greatly from his unselfish guidance and friendship. They are all mentioned as co-authors in his peer-reviewed publications of which there are over two hundred. Tissa Kappagoda was also an accomplished artist, exhibiting his water colours in galleries in Sacramento, California.

His contribution to cardiovascular science both as an investigator and a teacher was great, but these scientific achievements should not over-shadow his work as a caring physician devoted to the welfare of his patients. It is rare to find these two attributes in one person. He will be sorely missed. He is survived by his wife, Mary, two daughters, Shanthi and Manel, and three grand-daughters, Luna and Willow Kappagoda, and Ruby Whittier.

Experimental Physiology

Prize Presentations at Physiology 2015

The *Experimental Physiology* Inaugural Review Prize was awarded for the first time this year. It went to Jaume Padilla of University of Missouri, Department of Nutrition & Exercise.

The prize of £1000 is open to authors in the first three years of their first full faculty appointment at a University or Research institute anywhere in the world.

Jaume Padilla's Review article 'Role of habitual physical activity in modulating vascular insulin actions' is published in the July Issue of *Experimental Physiology*.

The *Experimental Physiology* Early career Author's Prize

Winner

Robert Regenhardt - *Centrally administered angiotensin-(1–7) increases the survival of stroke-prone spontaneously hypertensive rats,* by Robert W. Regenhardt, Adam P. Mecca, Fiona Desland, Phillip F. Ritucci-Chinni, Jacob A. Ludin, David Greenstein, Cristina Banuelos, Jennifer L. Bizon, Mary K. Reinhard & Colin Sumners (2014), *Exp Physiol* **99**, 442–453

Runner up

Martin Bahls - *Mother's exercise during pregnancy programmes vasomotor function in adult offspring*, by Martin Bahls, Ryan D. Sheldon, Pardis Taheripour, Kerry A. Clifford, Kallie B. Foust, Emily D. Breslin, Jeremy N. Marchant-Forde, Ryan A. Cabot, M. Harold Laughlin, Christopher A. Bidwell and Sean C. Newcomer (2014), *Exp Physiol* **99**, 205–219

2014 Impact factor

Experimental Physiology's two-year impact factor for 2014 was 2.669. During the Impact Factor window, the journal published more articles and received more cites than in any previous year and remained steady in all other metrics.

Physiological Reports

New article type

Physiological Reports is continuing to spread its wings, adding a new category of peer-reviewed article. Case Reports must have a physiological focus. The length of the report will be limited to 2,000 words, plus no more than two figures and two tables. We expect most Case Reports to be written by a trainee, in collaboration with a clinician and a physiologist.

Physiological Reports expands in China

It is anticipated that by 2020 China will match the USA's output of research papers. Physiological Reports is delighted to have recently appointed two additional Chinese physiologists to its Editorial Board: Bing Shen (Anhui Medical University) and Youhua Liu (University of Pittsburgh).

The Journal of Physiology

The Journal of Physiology's Impact Factor rises to 5.037

We are delighted to let readers know that *The Journal of Physiology's* Impact Factor (IF) has risen this year and we are now over the 5.0 barrier with an IF of 5.037. This is a great achievement and will doubtless mean that *JP* will now be an even more appealing journal for top-quality submissions.

Although the IF is the main metric to which people look, we are also pleased that *JP* continues to rank highly in the other citation metrics. Once again, *JP* is the most highly cited journal in Physiology (just under 49K cites last year) and we still rank joint first in the Cited Half-Life. *JP* has climbed the ranks for IF and Immediacy Index, and maintained its rank for the 5-year IF and Eigenfactor Score. *JP* fell in rank for the number or articles published (not a citation metric, but is crucial to the calculation) and Article Influence Score (although the actual figure only dropped by 1.8%).

Early Investigator Prize winners

We are pleased to announce the winners of the 2014 Early Investigator Prize. The prize is designed to reward early career authors who publish outstanding research papers in *The Journal*. All authors of accepted papers who are PhD students or have received their research degree (MD, PhD or equivalent) fewer than 6 years before submitting a paper are eligible.

Winner

Feng Yi - *Direct excitation of parvalbumin-positive interneurons by M1 muscarinic acetylcholine receptors: roles in cellular excitability, inhibitory transmission and cognition*, by Feng Yi, Jackson Ball, Kurt E. Stoll, Vaishali C. Satpute, Samantha M. Mitchell, Jordan L. Pauli, Benjamin B. Holloway, April D. Johnston, Neil M. Nathanson, Karl Deisseroth, David J. Gerber, Susumu Tonegawa and J. Josh Lawrence (2014). *J Physiol* **592 (16)**, 3463-3494

Runners up

Noah J. Marcus - *Carotid body denervation improves autonomic and cardiac function and attenuates disordered breathing in congestive heart failure*, by Noah J. Marcus, Rodrigo Del Rio, Evan P. Schultz, Xiao-Hong Xia and Harold D. Schultz (2014). *J Physiol*, **592 (2)**, 391-408

Rodrigo Del Rio - *Carotid body denervation improves autonomic and cardiac function and attenuates disordered breathing in congestive heart failure*, by Noah J. Marcus, Rodrigo Del Rio, Evan P. Schultz, Xiao-Hong Xia and Harold D. Schult (2014). *J Physiol* **592 (2)**, 391-408

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