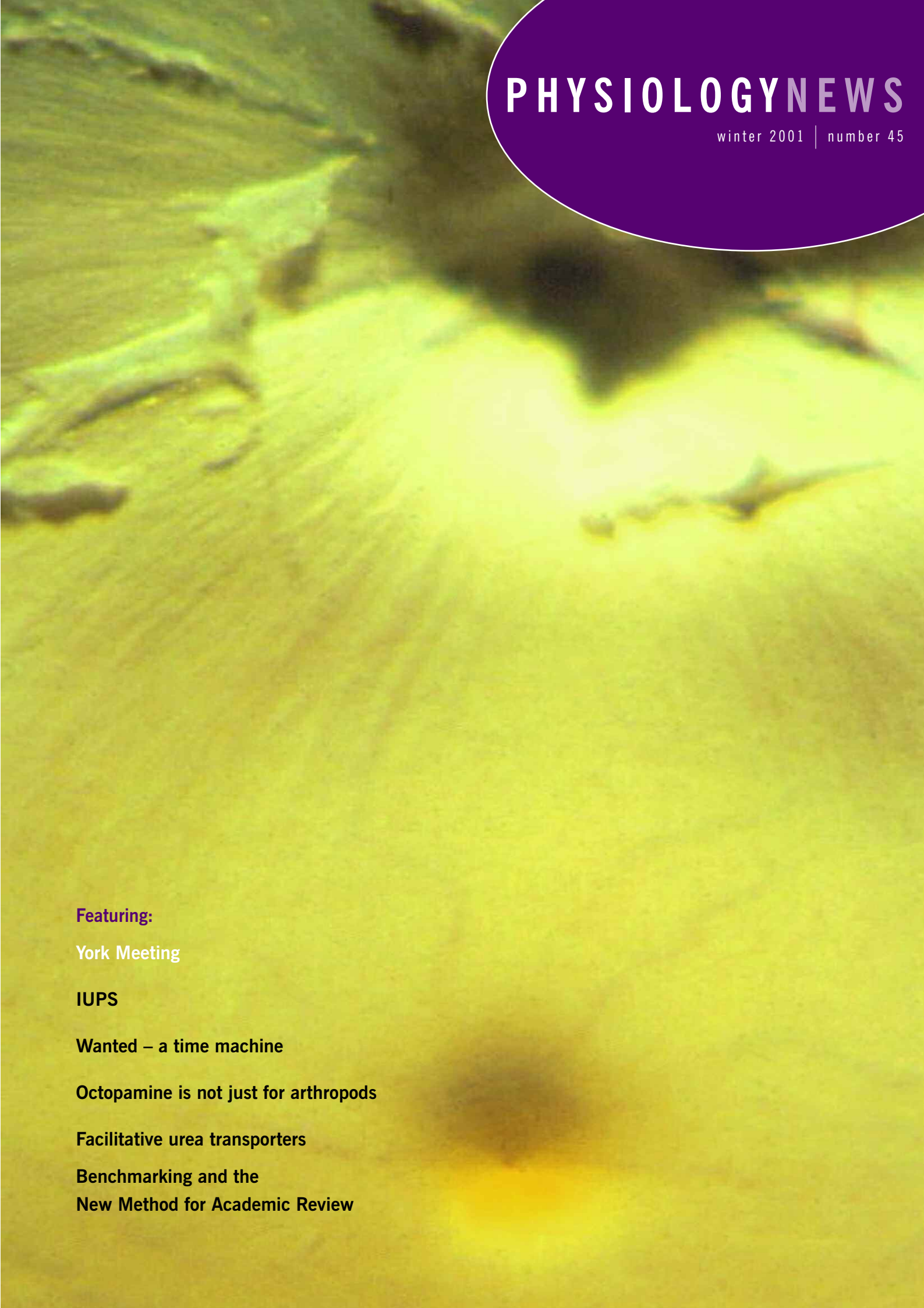

PHYSIOLOGYNEWS
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**Contributions and Queries**
**Executive Editor**
Sheila Greaves
Tel: 020 7631 1461
Fax: 020 7631 1462
Email: sgreaves@physoc.org

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**Cover photo**

Flat preparation of a monkey retina showing towards the bottom the foveal pit and the yellow macular pigment and at the top the optic disc (where the optic nerve leaves the eyeball) and the ganglion cell axons radiating from the disc across the surface of the retina. The image has been rotated clockwise through 90° for the cover. *Courtesy Professor John Marshall, St Thomas' Hospital*

# PHYSIOLOGYNEWS

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**Affiliate Travel Grant Scheme:**
The next deadlines for receipt of applications are 30 November 2001 and 31 January 2002.

**MSc Bursaries:**
The next deadline for receipt of applications is 30 November 2001.

**BSc Intercalated Bursaries:**
The next deadline for receipt of applications is 30 November 2001.

**Change of Address:**
Members should inform the Administration Office of any changes of address, telephone, fax or email addresses.

Changes can be emailed to: jgould@physoc.org

**Tübingen Meeting (15-19 March 2002):**
Information regarding Abstract submission to this meeting can be obtained from:
www.physoc.org/meetings/future.html

**University of Central Lancashire (9-10 May 2002):**
Abstracts must be submitted to the Meetings Secretary's Office by 13 February 2002.

**Address for abstract submissions:**
The Meetings Secretary, The Physiological Society (Abstract Submission), Dept of Biomedical Science, The University of Sheffield, Western Bank, Sheffield S10 2TN

**Magazine:**
Letters and articles and all other contributions for inclusion in the Spring issue should reach the Administration Office by 4 January 2002. Please cite all references in articles in the style of The Journal of Physiology.

## Guidlines for contributors

These guidelines are intended to assist authors in writing their contributions and to reduce the subsequent editing process. The Magazine Editorial Group is trying to ensure that all articles are written in a journalistic style so that they will have an immediate interest value for a wide readership and will be readable and comprehensible to non-experts. In particular, scientific articles should give a good overview of a field rather than focus on the authors' own research.

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The main message or question posed should be introduced in the first paragraph. The background for the topic should then be established, leading up to the final dénouement or conclusion.

**Length of articles**
This will be determined by the subject matter and agreed between the contributor and the commissioning editor. Articles will vary in length from 500 to 2000 words.

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Contact the Editor's office or the Administration office for submission dates. Late submissions will not be accepted or publication will be deferred to a later issue.

**Illustrations**
Authors are encouraged to submit diagrams, drawings, photographs or other artwork to illustrate their articles or, if they cannot provide these themselves, to suggest what artwork might be appropriate. Photographs may be colour or black & white, prints or transparencies.

**Author photographs**
The Magazine normally includes photographs of the authors of articles. These may be colour or black & white; prints are preferable if cropping is required.

**References**
Authors are requested to keep the number of references to a minimum (preferably no more than two or three), in the style of the Journal of Physiology.

**Suggestions for articles**
These should be made either to the Editor, to the Editorial Assistant or to a member of the Magazine Editorial Group (see contents page).

**Magazine Online**
The magazine is now available on our website.

EDITORIAL

PH

## The New Magazine

Welcome to the first edition of our new style magazine. We hope you like it and the new title "Physiology News". It seemed to the editorial team that many new things were happening in our Society and it was timely to launch the new format. The new council and executive committee are now in place and we have Professor Colin Blakemore as our first Society president. Colin has a long history of standing up for his beliefs, whether on animal experimentation or on democracy. I'm sure that we have a president who will engage you as Physiological Society members in modernising and democratising our Society.

The magazine is your magazine. Please send us short articles, news and views, political comment on the academic scene and, most of all, write letters to the editor to make specific points of your own or to comment on the views of others. Our Society is vibrant and growing and we believe that "Physiology News" should reflect that. In particular, please let us know, what you like or dislike about the new format.

As the accompanying opinion written by Austin Elliott makes clear, we scientists believe that science is a transnational affair. These transnational links may be personal, or they may be between us as a Society and our sister Societies throughout the world. As time goes on we will also need to make even stronger links with our sister Societies in Europe, as well as forming stronger and stronger bonds with other related Societies such as the British Pharmacological Society and the Biochemical Society and strengthening all our other links in Biology, through UK Life Sciences.

Finally, this issue of the magazine was largely produced in the four weeks following the World Trade Centre and Pentagon attacks on September 11th. While one could argue that a society newsletter is not the place for extended comment on world events, especially such grave ones, the editorial team as a whole felt we could not simply ignore them. Our response may still strike some readers as inappropriate. If so, we hope you will forgive us. I lived in New York for 15 months and saw the WTC towers being completed, while my deputy editor, Austin Elliott, recently spent a sabbatical year in Washington DC. I hope you will make allowances for the personal comment, and join the magazine editorial team in expressing our deep sorrow at the tragic loss of life, both on September 11th and in events since.

**Bill Winlow** *Editor*

## A personal view – Science and World Events

In this first issue of the renamed Physiology News we report on the IUPS meeting, where over two thousand physiologists and other scientists from related disciplines gathered for "our" four-yearly conference. The delegates came from all around the world to celebrate our communal enterprise – the revealing of more about how living organisms, including man, work. As scientists investigating the natural world at the start of the new millennium we are privileged to be part of a truly international undertaking.

Less than two weeks after the end of the IUPS meeting, perhaps while some members of the Society were still abroad or making their way home, came the terrible events of September 11th. Perhaps many of us thought of people we know in New York or Washington, or contacted our friends there to check that they were safe. The events emphasise the fragility of the international systems of travel and commerce on which we depend.

As scientists we have the chance, not given to many people, to travel widely in the world, and to work with people from many countries and cultures. During my twenty years working in science I have shared lab and office space with scientists from all the continents of the world, from both rich and poor countries. I remember one lab in the USA where a large map on the wall indicated the countries of origin of the people working there, from Japan to Bangladesh, from India to Iran, from Britain to Russia to South Africa, and many others apart from the USA. This experience is hardly unique. We are privileged to work with our colleagues from other countries, discuss things in the common language of science, and to learn something about them and their cultures.

If this kind of experience teaches us anything, it must be that people the world over seek basically the same things: the happiness of those that are close to them, work from which they can take some satisfaction, a better life for their families. It doesn't seem so very complicated.

However, in today's world, not everyone is as lucky as we scientists. Science is international – that is one of its great strengths. It shows how a worldwide community can focus on a common goal, and draw strength from its diversity. As the world absorbs the horror of September 11th and its aftermath, we can only hope that, one day, the same will be true in all spheres of human endeavour. We can also hope that the international scientific community will do its part in helping to break down the cultural barriers.

**Austin Elliott**

# Welcome to The University of York

George Kellett

## Biology at York

The Biology Department at York is a multidisciplinary Biosciences department that spans contemporary biology – from the molecular and cell biology to the physiological and ecological. The Biology Department also has very close links with the BBSRC Structural Biology Laboratory in the Department of Chemistry. The seamless transition between these conventionally disparate areas has created a research environment that actively encourages cross-disciplinary interactions within the Department.

The Department is headed by ecologist Professor Alastair Fitter. It has more than 40 academic staff plus 22 senior Research Fellows, 100 postdoctoral fellows and other contract research staff, 53 taught graduate students attending MRes and MSc courses, 92 research graduate students doing DPhils, 91 technical staff, 34 secretarial and administrative staff, and approximately 400 undergraduates. Several senior positions in the Department are funded by charities or industry, including four Research Professorships, two funded by Yorkshire Cancer Research and one by York Against Cancer as well as a research lectureship funded by Smith & Nephew. We also have four Royal Society Research Fellows, three Wellcome Trust Fellows, and one each from BBSRC and the Arthritis Research Council. These external links are an essential feature of the Department.

The success of the Department in obtaining a rating of 5 in the 1996 RAE has been reflected in major awards that are now powering the Department's expansion. A new building is currently being built and on course for completion by summer 2002. It has been made possible by a JIF award of £21.6M and other contributions from the University, HEFCE and Yorkshire Cancer Research. The new building will include a Technology Facility with dedicated laboratories for Bioinformatics, Nucleic Acids, Protein Production, Biochemistry, Molecular Interactions and Imaging and Cytometry. The building will also house the laboratories of the Yorkshire Cancer Research Unit and also the Centre for Novel Agricultural Products (CNAP), which has received funding of £7.35M from Government and charitable sources. The Structural Biology Laboratory of the Chemistry Department will be relocated to the new laboratories and the new Professor of Biochemistry, Colin Kleanthous, will join the Department from UEA in 2002. Altogether, the new laboratories will house 383 staff and permit the expansion of the Department by some 40%.

Core research in the Department can conveniently be described as falling into three main areas: Biomedical Science (including Cancer, Infection and Immunity, Biomolecular Interactions, Cell and Tissue Research, and Developmental Biology), Plant Cell and Molecular Biology, and Ecology (including Physiological, Molecular and Evolutionary Ecology and Population, Community and Systems Ecology). While much of the research is undertaken in the laboratories of academics with teaching positions, there are also a number of research units within the Department. These include the Environmental Archaeology Unit; CNAP, headed by Professor Dianna Bowles, who was elected this year to membership of the European Molecular Biology Organisation (EMBO) for her work on proteins that function in plant stress responses; the Stockholm Environmental Institute at York (SEIY), the Medical Cryobiology Unit, the York against Cancer Jack Birch Unit for Molecular Carcinogenesis; the Yorkshire Cancer Research p53 laboratory;

the Yorkshire Cancer Research Unit headed by Professor Norman Maitland, winner of the International Prize for studies on prostate cancer. In addition, several joint projects are underway between labs in the Biology Department and the Structural Biology Laboratory (SBL) headed by Professor Rod Hubbard, which is in the Chemistry Department. Research in the Department is overseen by a Research Committee, chaired by Professor Dale Sanders, who was elected this year as a Fellow of the Royal Society for his work on plant membrane transport.

Biomedical and Biomolecular Science comprises five areas: Cancer, Infection & Immunity, Biomolecular Interactions, Cell & Tissue Research, and Developmental Biology. Inevitably in a broad-based Department, there are few down-the-line specialists in any subject: almost everyone is multidisciplinary in background, whatever area of the Department they work in. That is equally true where physiology is concerned. Ask anyone whether they are a physiologist and you'll find maybe one or two brave souls. Ask someone if they work on a physiological system – or a system that used to be regarded as the preserve of classical physiologists – and you'll have much more success. You'll most likely find a biochemist, geneticist or cell biologist. On the other hand, ask an ecologist what subject they trained in and, in at least three cases, you'll even find a physiologist. That is one of the defining features of the York Biology Department – the freedom to move large distances in science, often very quickly.

Prominent among groups working in the physiological area is the Molecular Motors Group. This consists of four interacting labs with interests in a variety of molecular motors from the more traditional muscle actomyosin system, through non-muscle myosins to the studies of DNA-dependent RNA polymerase. The principal investigators include Justin Molloy, John Sparrow, Claudia Veigel and Jim Hoggett. The joint activities within the Group centre on single molecule technologies, including optical (TIRF microscopy) and mechanical (optical tweezers) methods. These are used to observe individual biomolecular interactions to study the mechanisms of force production and control of mutant motor proteins, including myosin IIs (cardiac, skeletal muscle), non-muscle myosins (I and V) and *E. coli* T7 polymerase.

Members of the Molecular Motors Group have recently measured the stiffness, force and displacement produced by a single muscle protein (actomyosin) interaction. Moreover, using slower, cytoplasmic myosins (myosin I), the Group have observed discrete phases of the mechanical power-stroke produced during an individual turnover. The aim of these experiments has been to increase our understanding of the mechanism of mechano-chemical energy transduction by molecular motors. The Group also exploits genetic

The University of York campus
*Photo: Martin Rosenberg*

City centre in York *Photo: Martin Rosenberg*

approaches to study the molecular details of protein interactions in flight muscles of *Drosophila melanogaster*. They have developed assays to measure mutant muscle and protein function from the fibre level right down to single molecule mechanics of actin and myosin. In addition, the Group is also investigating the mechanism of DNA transcription. They have recently observed initiation and elongation complex formation by T7 RNA polymerase, one of the first labs in the world to do so.

The epithelial transport group of George Kellett works on the regulation of intestinal nutrient transport, especially sugars and peptides. The group has recently provided evidence that the passive component of intestinal glucose absorption is mediated by the rapid, glucose-dependent activation and recruitment of GLUT2 to the brush-border membrane; regulation involves a PKC-dependent pathway activated by glucose transport through SGLT1. This facilitated pathway is the major pathway of glucose absorption at high glucose concentrations, being some 3- to 5- greater than that by SGLT1. Their work provides a framework for investigating the short-term regulation of the sugar absorption during the assimilation of a meal. In collaboration with Richard Boyd (Oxford) and Pat Bailey (Heriot-Watt), George Kellet, Emma Shepherd, Norma Lister and Ramsey Bronk have also been investigating the regulation of peptide transport across the basolateral membrane of the small intestine.

Henry Leese works on the nutrition of early mammalian embryos and their environment in the female reproductive tract. He co-ordinates an MRC Co-operative on the *Development of the Early Human Embryo* comprising five laboratories in the universities of Leeds, Manchester, Southampton and York. Henry has developed microfluorometric methods, many of them non-invasive, for measuring the uptake of oxygen and nutrients such as glucose, pyruvate and amino acids by single embryos from the mouse, cow, pig, sheep and human. His current research aims to understand how cellular stress compromises early embryo development. The work is being applied to improve assisted conception techniques in man and domestic animals; notably, to increase success rates and minimise multiple births, in human In Vitro Fertilisation.

Betsy Pownall is working on how cell lineage is established during embryonic development. Her work focuses on the MyoD genes, which have been called the master regulators of myogenesis. MyoD genes effectively act as a developmental switch leading to myogenic determination: transfecting any one of the genes will convert non-muscle cells into skeletal muscle. Currently Betsy is using *Xenopus laevis* in order to identify transcription factors and signals important in the activation and maintenance of *myoD* and *myf5*. Harv Isaacs also works in developmental biology. Harv is investigating the molecular pathways involved in regulating the development and patterning of the anteroposterior (head to tail) axis of the vertebrate embryo. Using *Xenopus laevis*, he has shown that Cdx factors have a crucial role in the development of the trunk and tail regions of the frog embryo, and that Cdx factors are key regulators of the Hox family of genes. The Hox proteins are another highly conserved family of transcription factors involved in anteroposterior patterning of the head to tail axis of all animals.

Chris Elliott's research focuses on invertebrate neural networks, especially those used in snail feeding. Everyone knows that snails are slow, but a fundamental question remains, why? What factors control the timing in a neural network? Over the last few years he has addressed this question using pharmacological and laser ablation techniques. His recent work shows that octopamine, a transmitter well described in insects, but little known in molluscs, plays an important role in stimulating feeding, with actions over several rasping cycles. Chris is also interested in how a snail decides when to feed; it even seems that snails learn to like lettuce!

John Currey is Professor of Physiology, Emeritus and, along with Mark Williamson, ecologist, and Ramsey Bronk, biochemist, is one of the founding fathers of the Department. John's research focuses on what happens when a bone breaks. We know a great deal about the stresses and strains that have to be imposed on bones in order to make them break, but we still have very little idea of what goes on in a nitty-gritty way as cracks start to form, coalesce, and become dangerous. When bone starts to break thousands of little microcracks form. Typically they only reach a few microns in length before they come to a halt. The big question is, what brings them to a halt? John has been pursuing these microcracks, seeing, for instance, how there are less of them in brittle bone, how they relate to the bone's histology, and how there are less of them in bone that has been irradiated. He is now getting some idea about how microcracks grow and multiply.

A major hallmark of arthritic disease is the proteolytic degradation of aggrecan and type II collagen, the

major extracellular matrix components of the load bearing connective tissue in the joint: degradation leads to loss of joint function in the end stages of disease. Vera Knaüper is investigating the way these proteolytic changes are brought about by two major classes of metalloproteinases, the matrix metalloproteinases and the metalloproteinases with disintegrin and thrombospondin motifs, some of which are also depicted as aggrecanases. Vera is working to understand how these enzymes are regulated and how their structure relates to their function; she is also developing novel gene therapeutic strategies for the treatment of arthritic disease using a proteomic approach.

## Teaching in the Department of Biology at York

Teaching, as well as research, is taken very seriously by the Department; we were therefore very pleased to be awarded a QAA score of 24 in February, 2000. The Department offers undergraduate (BSc) and graduate (MRes) courses across the spectrum of Biology. Our main undergraduate course is in Biology, but specialist degrees in Molecular Cell Biology, Genetics and Ecology, Conservation and Environment are all available. We run joint undergraduate and graduate courses in Biochemistry (BSc) and Biomolecular Science (MRes) with the Department of Chemistry and in Environmental Biology and Environmental Management (BSc) and Ecology and Environmental Management (MRes) with the Environment Department. Our new MRes in Bioinformatics is run jointly with Chemistry and the Department of Computer Science. Undergraduate courses can be intercalated with a year in industry or a research laboratory, in a North American University or, under the European Union Socrates scheme, in a German or French University.

## The York-Hull Medical School

A new medical school to be run jointly by the Universities of York and Hull has been approved. The first students are due to arrive in October 2003, so planning is at a very active stage. It is inevitable then that things physiological at York will change significantly in the future.

York minster
*Photo: Martin Rosenberg*

**George Kellett**
*Department of Biology*
*University of York*

# 34th International Congress of Physiological Sciences: from molecule to malady

## Christchurch, New Zealand, August 26 - 31, 2001

**At the end of August over 2000 physiologists attended the 34th IUPS Congress in Christchurch, New Zealand. Here John Lee and Austin Elliott report from the other side of the world.**

### Welcome to Christchurch

First off, Christchurch is just such a nice place to hold a meeting. Everyone who has been to New Zealand will understand. For those of you who haven't, here are some of the reasons why. The people are delightful, amazingly friendly and incredibly helpful. Rush hour in the city centre typically equals all of three cars at a traffic light. The meeting facilities are excellent and within easy walking distance of everywhere you want to be. There is an excellent arts centre and a real buzz of life around the many shops, coffee houses and eateries. And yet, compared to the normal tempo of European life, every day feels like a Sunday afternoon. Plus, with three New Zealand dollars to the pound and prices that are approaching (though not quite) pound for dollar, you can live comfortably for quite a modest outlay. Alternatively, you can spend what you would normally spend and have a few days feeling substantially more like Mr or Ms Big than is usually possible, especially when travelling.

### And some background

The city of Christchurch in the South of England sits on the river Avon and, funnily enough, so does the one in New Zealand. But this turns out to be one of those situations where the obvious explanation is wrong; in fact, neither the city nor the river is named for its English counterpart. The city is named after Christchurch College in Oxford, where one of the original settlers' leaders was educated, and the river (we have it on good authority) is named after the Avon in Scotland, rather than the English one. Strolling along the picturesque riverside walkways, it is thought-provoking to see the old pictures on historical placards showing that only 150 years ago there was no city here at all. Even more thought-provoking is the view from the Christchurch gondola (cable car), high up on the edge of the volcanic Banks peninsula. From here you can appreciate that just a few hundred thousand years ago the whole area was underwater, not to mention thirty or forty miles offshore. Erosion from the spectacular Southern Alps, which can be seen sparkling in the distance, has created (and continues to expand) the vast, flat expanse of the Canterbury plains, where Christchurch now sits a few miles from the sea.

Incidentally, this exhaustive background research was carried out over the weekend before the meeting. And we want you to appreciate the considerable dedication of your correspondents in acquiring it, suffering as we were from – inter alia – sore lower legs, shortness of breath, mentally incapacitating jetlag, a tendency to speak backwards, and stomach pain that should have been due to taking aspirin to fend off deep vein thrombosis (except that we forgot to take it).

### On to the Conference

The conference formally started with the opening ceremony on Sunday afternoon (see Box 1), and by the time the meeting started in earnest on Monday morning we were ready. During the week we tried to assess how well the meeting achieved its evident desire to combine the two central subject areas in biology: physiology and pathology – or how organisms work and how they go wrong. Note that we don't set much store by the current wave of hand-wringing about whether these subjects even exist any more (whatever the thoughts of people who reorganise university faculty titles). Ultimately, both physiology and pathology focus on functioning cells, or the "elementary patients" of medicine, to borrow a term from the excellent general pathology textbook by Majno and Joris. In spite of the ever-increasing focus by much of the biomedical research community on "molecular issues" over the last decade or so, there

Entrance to the Convention Centre *Photo: A Elliott*

remains the basic biological truth that function is integrated at the cellular level. Consequently, it tends to be at this or the higher systems level that most biologically or medically relevant insights into normal or abnormal functioning are found. Whatever the current fads and fashions, that's the way biology is. [That's enough soapbox! – Editor.]

## A conference style for the 21st century?

There were a number of interesting attempts to make the 2001 meeting "different". First, there was no book of abstracts, just a programme booklet and a CD. A bank of 50 or so computers was available in the conference centre for delegates like us (Editor please note) not important enough to have our own laptop. Basically this was a laudable idea, but it didn't quite work. A major flaw was the decision to include only major lectures, session titles and author names in the programme booklet. This made browsing the conference programme a pain, since you had to queue up for a computer to do it. Furthermore, the queues were often quite slow, because many delegates were using the conference PCs (at length!) to keep in touch with home by email. All that was required to have carried off the "paper-free abstract book" approach (conference organisers please note for next time) was a few extra pages in the booklet containing the actual titles of all the contributions. Then we could have browsed for interesting talks or posters without waiting and without the added worry that our travel insurance didn't seem to mention cover for spilling a double cappuccino over one of the conference computers.

## Thesis, Antithesis Synthesium?

Another difference was the organisation of the bulk of the conference into "synthesia". The idea was that each synthesium would contain three or four overview presentations in a general subject area, with time for discussion and debate. Many of the synthesia also had a related poster session. On the first day, for example, there were synthesia on "Data acquisition techniques for genome-based physiology", "Water balance", "Molecular motors", "Ion channel gating", "Modelling cellular complexity", "Membrane targeting", "Effects of mechanical forces on gene expression" and several others. Again, this was an excellent idea for a four-yearly overview meeting, though the variability of its success highlighted a number of operational issues. For these sessions to work well they need well-briefed speakers who stick to their remit, a proactive chairman who sets the scene, controls the speakers and stimulates debate, and adequate time

BOX 1

## A New Zealand hello

The opening ceremony provided one highlight of the meeting. The stage was occupied by a group of Maori dancers and warriors in traditional costume. Members of the IUPS Council, forming something of a contrast in full academic dress (!), then approached up the aisle to be met by a symbolic spear-waving challenge. You could imagine this would have been highly effective at putting intruders in a suitably placatory fame of mind in days gone by. The challenge triggered a series of speeches from both sides. Since these were largely in Maori, and the meeting did not support simultaneous translation, most of us could not follow the actual words. But the general thrust of the ceremony was clear enough, with the IUPS responding to the challenge with statements of their peaceful and honorable intentions, further speeches of welcome from the Maori and finally celebratory singing and dancing (thankfully only by the professionals, not the IUPS delegation). Although the ceremony did seem slightly surreal, juxtaposing loincloths and grass skirts with full academic regalia (both equally anachronistic forms of dress), it was nevertheless oddly touching, mainly due to the obvious sincerity of all the participants. Two speeches in English, from a Maori dignitary and from the Mayor of Christchurch, both emphasised the role of scientists in society as interpreters of the natural world. It was certainly easier to feel closer to the natural world, and to appreciate that role, surrounded by the natural beauty and remoteness of New Zealand.

*Top* Maori warrior with spear waiting to challenge the IUPS delegation

*Left* Maori Poi dance

*Below left* The IUPS delegation. Denis Noble (Secretary-General of IUPS) is in the centre

*Below right* The Maori Haka

*All photos from P Nielsen*

BOX 2

### A successful synthesium

Among the synthesia, the one on "Water Transport Controversies" sponsored by the Journal of Physiology worked particularly well. Each main talk was followed by a brief contribution from a discussant presenting an opposing, or at least a divergent view. For example, Walter Boron presented work from his lab indicating that aquaporin (AQP) water channels can act as membrane permeation pathways for gases (see the News and Views article by Gordon Cooper in issue no. 43). Boron was followed by Alan Verkman, who gave an incisive 5-minute résumé of his lab's work with various AQP knockout mice. This clearly implied that the AQPs were not involved in gas permeation, at least in the systems they had studied. The question of whether solute transporters also transport water was treated similarly, with a talk from Ernie Wright presenting evidence for the theory, followed by a brief presentation by Jean-Yves Lapointe who argued that much of the evidence could be artifactual. In both cases a real dialogue ensued, with authors defending their positions, discussing each other's work and elaborating on their ideas in response to questions from the audience.

The take-home message is that the synthesium format really can add something extra. But for it to work well there has to be concerted effort and a lot of forethought from the organisers, the moderators and all the speakers. It would be good to see some synthesia appearing in other programmes alongside the standard "talk and questions" symposia.

for the debate to actually happen. Successful sessions had the first two, but they could all have done with more of the third, namely time for discussion. Scientific meetings seem – like nature, politics and our in-trays – to abhor a vacuum, with organisers worried that too much time for discussion might lead to – horror of horrors – a session which finished early if the questions didn't materialise. Hmmm, just think of the professional chaos that could cause. But it is surely better to risk having an extra cup of coffee than to hurry, or even cut off, a really interesting discussion that was just getting going. To get a flavour of a successful synthesium, see Box 2.

## Keynotes, high notes, b*m notes?

Each day started and usually ended with one or more keynote lectures, which were again flagged as general overviews of the designated subject area. Some of these were excellent, but unfortunately, others were poor – and even sometimes downright dire – with several distinguished speakers obviously having made no effort to do anything other than wheel out their usual hyper-technical talk for aficionados. One such display was rewarded by half the audience walking out, and quite right too. It is surely a worrying sign of decadence in a profession when famous names – people who are supposed to set an example for the rest of us – seem willing to take the airfare, but unwilling to fulfil their remit, or even just to customise their standard talk slightly.

Incidentally, when we say that the day started with the keynote lectures, we are referring only to mere mortals. For delegates with Olympian constitutions (and specifically clinical interests) the organisers had thoughtfully arranged "Continuing Medical Education breakfast sessions" starting at 6.45 am (sic). Anecdotal evidence indicated that this format is North American in origin, raising the question – do American clinicians really enjoy getting up at 5 am? Rather nice coffee and croissants were provided, and for your correspondent who attended, the value of these sessions was only marginally impaired by his inability to think straight or focus his eyes properly, and an overwhelming tendency to assume a horizontal position within five minutes of the first slide.

## Demonstrators and animal experimentation

One slightly unexpected feature of the conference was the presence on most days of a group of animal rights protesters outside the Town Hall and Convention Centre. Although they rarely numbered more than about a hundred, the demonstrators used drums to make as much noise as possible. The disruption to the meeting was actually fairly minimal, since the two main venues were linked by an enclosed bridge, meaning delegates didn't have to walk through the protestors to get from one part of the meeting to the another. According to local sources, some fairly sensationalist pre-conference stories in the local media, particularly about American neuroscientist Michael Stryker, probably played a large part in generating the protests. After the publicity given to his experiments with the cat visual system, Stryker received at least one written death threat. Nonetheless, he courageously came to the meeting to give a Distinguished Lecture on his work, as well as defending his research in an interview on New Zealand National Radio.

Although the tone of the banners carried by the demonstrators was predictable ("They'll get your pet", "Cat-killing B*stards", "Vivisection kills" and so on), little personal harassment or abuse was, to our knowledge, directed against individual delegates; indeed, compared to similar protests in Europe, it all seemed fairly low key. Most of the protesters were clearly young (teens or early twenties) and seemed content just with being there and being noisy. In general, there seemed to be a healthy measure of respect among many delegates for the demonstrators, or at least for the relatively restrained manner in which they made their protest. "It's a democracy, so they have the right to be there" was one comment. "I think it's a pity we're not out there debating with them" was another.

The need to engage with the anti-animal-experiment groups, and with the general public, over the importance of animal experimentation was a recurring theme of the conference. The Mayor of Christchurch, Garry Moore, stressed the need for such dialogue in his opening speech, and this was reiterated again in the conference's closing remarks. These events underlined the fact that, whatever past triumphs, all researchers need to be aware that the issue of the types and extent of animal research that society feels comfortable with is never going to go away. Everyone engaged in this type of work will continue to have to justify it and we can all play a part in ensuring reasoned and informed discussion. Having said that, a mature research community must also appreciate that there may be types of research which it feels are justified and reasonable, but which society at large does not support, even when well-informed of the rationale for the work.


Animal rights protesters outside the congress *Photo P Nielsen*

## From molecule to malady – or just halfway?

Another impression from the conference is the recurrent difficulty of convincingly bringing together non-clinical and clinical scientists. For a start, not many clinicians were there. And, with a few outstanding exceptions, it was particularly noticeable that hardly any of the presentations were by clinical scientists. Presumably this was at least in part because the meeting was mainly organised by, and for, basic scientists. But the upshot is that that the meeting was not totally successful in bridging the "molecule to malady" divide, because it did not include enough people who know in detail about the maladies. Of course, the converse also typically applies to meetings organised by clinicians. This problem is decades old, but it seems to have worsened noticeably in recent years as trends in the organisation and assessment of research, teaching and medical care have pushed the basic science and clinical communities further apart. But it remains important that we try harder to get round the problem, since improved dialogue along this axis can only be good for both groups.

## New knowledge across the phyla

These problems aside, as a showcase of physiological science, the meeting was a success. Few delegates can have failed to learn something useful – even if it was something that they hadn't realised they wanted to know! One of our favourites was a poster by the inimitable John West, which showed that elephants do not possess a pleural cavity (the parietal and visceral pleura are firmly stuck together). We are not entirely sure, though, about the explanation that this is because it prevents them from getting a pneumothorax when they wade across lakes and rivers with just their trunks above the surface (how much of a selective evolutionary pressure can that be?). Another gem was a presentation on elephant seals, pointing out that they should be classified as "surfacing mammals", rather than diving ones, since they spend over 70% of their entire lives – and over 95% of their time at sea – holding their breath underwater. It is too early to tell whether studies like this will eventually help us understand the ways in which tissues can tolerate and even function normally under conditions of marginal oxygenation. But it is still amazing to think of these huge animals spending only 3 minutes per hour at the surface, for weeks on end, as they go about their daily business. After all, knowing about these things for their own sake and for the deeper appreciation of our world – curiosity-driven research – is a large part of what science is supposed to be about. The next IUPS congress is in 2005 in America and the one after that is in 2009 in Kyoto in Japan. See you there.

**Austin Elliott**
*School of Biological Sciences, University of Manchester*
**John Lee**
*Consultant Pathologist, Rotherham District General Hospital*

# Wanted – a time machine

**Visual impairment increases with age. John Mellerio speculates as to why this is and requests a time machine to collect some easy answers.**

John Mellerio

Life expectancy in 1900 was 45 years but in 2000 it was over 80. In 1951 there were fewer than 300 centenarians alive in the England and Wales: by 2035 it is estimated this number will be over 40,000. All this is, of course, a Good Thing. It came about because the diseases which killed off millions before their three score years and ten have largely been overcome. This success has allowed the so-called diseases of old age to enter the scene and now cancer, neurological problems, cardiovascular deterioration and various degenerations are the killers. And if people escape these, it seems they get senile and just wear out so they cannot resist a simple infection, like pneumonia, that a younger person would shake off.

Some people, noting that their motor cars work for longer and better if an effective program of preventative maintenance is carried out, have felt that it might be possible to take similar action with humans as they age. I am one of these people, but my expertise is in the limited area of vision. However, for the elderly, poor sight is an important disability and for the nation, a costly problem. It would be very worthwhile to come up with a life-time maintenance programme for vision and extend visual function to 100 years and more.

**Estimates for 1996 of visually impaired persons by age group (total population: 58,801,500)**

| | 0 to 15 | 16 to 64 | 65 to 74 | over 75 | total |
|---|---|---|---|---|---|
| number | 24,200 | 166,140 | 125,940 | 750,460 | 1,066,740 |
| as % of population | 0.04 | 0.28 | 0.21 | 1.28 | 1.81 |

**Table 1** Estimates of visually impaired people by age group for 1996 in the UK – figures from RNIB. Visual impairment may be taken as the inability to read correctly the large top letter of an eye test chart at distance greater than six metres (a normal person would perform the same at a distance of 60 m).

| condition | 1969-76 0 – 64 yrs | 1970 only over 65 yrs |
|---|---|---|
| glaucoma | 7.1 | 14.6 |
| cataract | 7.6 | 21.1 |
| choroidal atrophy | 11.2 | 5.0 |
| retinal detachment | 2.9 | 0.3 |
| retinitis pigmentosa | 6.4 | 0.2 |
| macular lesion | 4.7 | 46,5 |
| retinal diabetes | 18.7 | 4.3 |
| optic nerve atrophy | 15.5 | 1.9 |
| several miscellaneous causes | 25.9 | 6.1 |

**Table 2** Causes of blindness in the under 65's and over 65's

Table 1 shows how visually impaired numbers increase with age. The causes of visual impairment and blindness are many but they change with age as Table 2 shows. Below 65 years, diabetes and optic nerve atrophy are major causes, but for the over 65's, macular lesions and cataracts head the list. These days cataracts are, in the developed world, no longer a serious problem and are easily removed, but macular lesions are a different story. Figures 1 & 2 show the retina at the back of the eye and how the foveal pit is positioned in the centre of the macula. Also shown is the position of the macular pigment (MP) within the retina. This pigment is a yellow mixture of two carotenoids, lutein (L) and zeaxanthin (Z). The presence of L and Z poses several questions, some of which we flatter ourselves by believing that we know the answer.

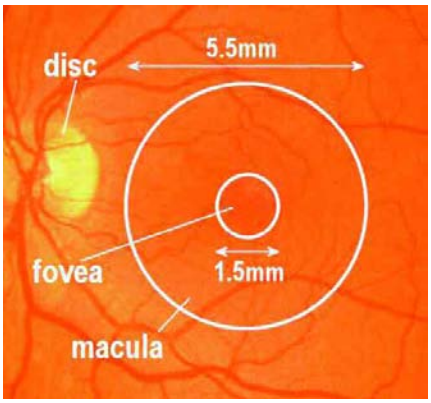


**Figure 1** Photograph of the retina of a human eye with the extent of the fovea and macula overlaid. The macular pigment is distributed in a bell shaped curve with the peak in the centre of the fovea and trailing to insignificant concentrations well before the edge of the macula.

As Figure 2 shows, MP is situated in front of the light-sensitive outer segment portion of the photoreceptors which in the fovea are mostly cones. It is yellow which means that it absorbs blue light and this led to the first suggestion for the function of MP. The eye is not a perfect optical instrument, it suffers from chromatic aberration – the retinal image shows coloured fringes which will reduce the acuity of the eye. The yellow MP absorbs the

blue light so the spread of the colour fringes will be reduced. Acting as a pre-receptor yellow filter, the MP would be expected to interfere with colour vision – indeed, the first attempts to measure the absorption spectrum and the amount of pigment present in an eye were made by vision scientists investigating colour vision. They wanted to know what the receptors would do without a yellow filter. Figure 3 shows that the spectral absorption curve for MP has a maximum absorption for blue light of 462 nm wavelength. Although the idea of MP as a chromatic aberration correcter is undoubtedly sound, it may not be very effective at this job (Hammond *et al*, 2001). On average, the optical density of MP is about 0.4 log units, i.e. it absorbs about 60% of the incident light, so some blue fringes would remain. Also, the centre of the fovea, the foveola where visual acuity is best, contains no blue sensitive or S cones which are responsible for absorbing blue short wavelength light to facilitate colour vision. It is as though the foveola is tritanopic, that is, it behaves as though it was blue colour blind. The MP will not, therefore, affect the blue channel of the trichromatic colour vision system at the very centre of gaze and its effect on the M and L cones (green and red absorbing, respectively) will be small, as Figure 3 shows. It remains to be shown how important for vision is the aberration correction function of MP.

MP, acting as a blue light absorber, has another role. It has been shown that short wavelength light, because of its relatively high photon energy, more readily damages the retina than yellow or red light which is less energetic. In animal experiments long exposures to levels of light such as are produced by fluorescent lamps or by a bright cloudy sky can lead to retinal damage and the short wavelength light is very effective in this. MP will absorb the energetic blue light and thus protect the photoreceptors of the macula. That MP is concentrated in the macula, around the optical axis of the eye, is an additional protective factor because the intensity of the retinal image is greatest in this on-axis area.

Recently, it has become apparent that MP has a much more important role in protecting the retina. Carotenoids in general are known for their antioxidant and free radical scavenging properties (Krinsky, 1989; Jacob & Burri, 1996). Lutein and zeaxanthin (Figure 4) are two very similar carotenoids that are not manufactured in the body but have to come directly from the diet. The best food sources of L and Z are not the same as for β-carotine which is perhaps the most famous carotenoid. Whilst dark green vegetables (spinach and so on) were recommended as sources of L and Z, it seems that maize and orange pepper are better respectively for L and Z (Sommerberg *et al* 1998).

When radiation such as UV and short wavelength (blue) light interacts with tissues, especially with molecules called photo-sensitisers, there is formed a range of excited singlet state molecules. These are very reactive and are short lived: they lose the energy they gained in the excitation process by forming photoproducts, by fluorescing or by generating so-called triplet state molecules (Mellerio, 1991). These excited triplet state molecules are longer lived and may react with the molecules found in the tissues, especially with oxygen, to produce free radicals such as the oxygen free radical

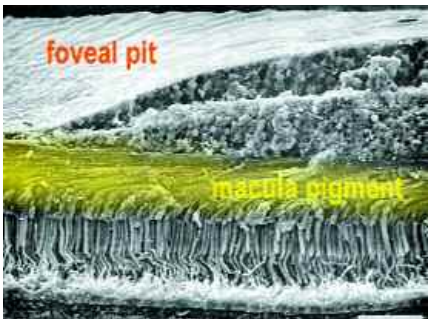


**Figure 2** Scanning electron micrograph of a section through half of the foveal area clearly showing the foveal depression. The macular pigment is shown mainly concentrated in the fibre layer of Henle – the axons of the cones. *Courtesy of John Marshall.*

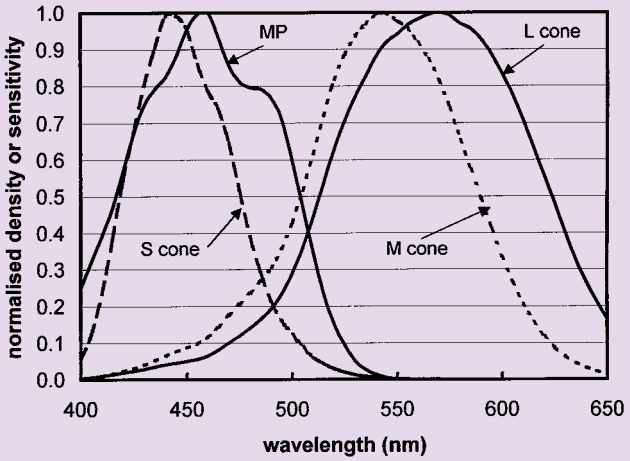


**Figure 3** The spectral absorption of the macular pigment and the spectral sensitivity curves of the three cone systems, S (short wavelength or blue absorbing), M (medium, green absorbing) and L (long, red absorbing). The curves have all been normalised.

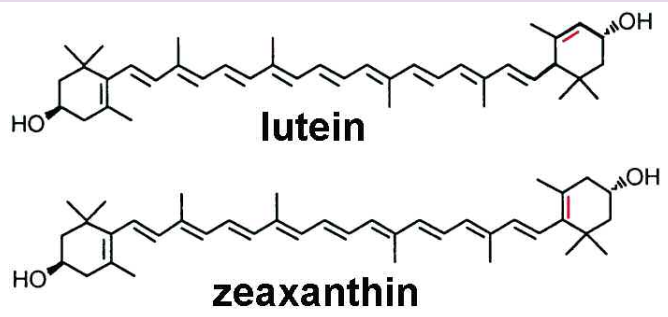


**Figure 4** The two carotenoids that make up macular pigment.

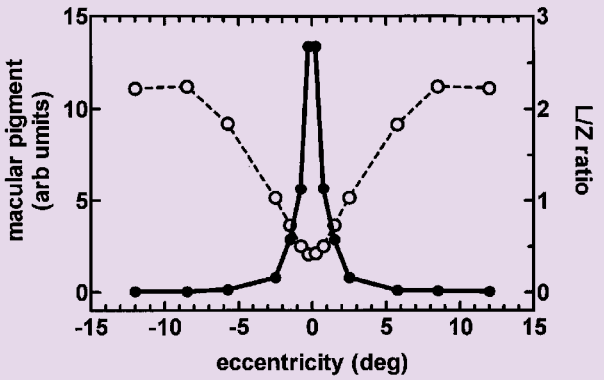


**Figure 6a** The optical density of macular pigment plotted (by solid dots) against retinal eccentricity from the fovea outwards. Also shown (by open dots) is the ratio of lutein to zeaxanthin and how it varies with eccentricity. (from Landrum and Bone, 2001)

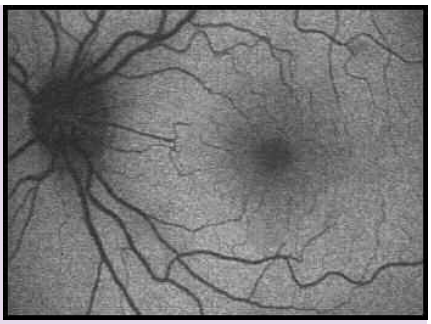

**Figure 6b** An autofluorescent photograph of the central retina of a man. This technique induces fluorescence of retinal components with blue light and, with appropriate barrier filters, records the green fluorescence. The presence of macular pigment is shown dark as fluorescence is less, the pigment absorbing the exciting blue light (courtesy of van Kruijk *et al*, 2001).

superoxide and the hydroxyl radical, or give rise to the destructive singlet oxygen. These various radicals are not good news as they can in turn oxidise tissue molecules. At especial risk are polyunsaturated fatty acids (PUFA) which enter a chain reaction called lipid peroxidation. Any cellular structure that is rich in PUFA's is at risk, and the photosensitive outer segments of rods and cones are formed of stacks of discs made from plasma membrane rich in PUFA's (Marshall, 1985). Figure 5 shows a rod outer segment in the first stages of light damage – the regularity of the discs is interrupted by centres of lipid peroxidation and the picture is reminiscent of a woolly sweater after a visitation by moths.

The two important protective properties of carotenoids, namely singlet oxygen quenching and the scavenging of reactive oxygen species, vary across the range of carotenoids and with the conditions used to measure these properties (Schalch *et al*, 1999). For example, *in vitro*, zeaxanthin has about twice the capacity to quench singlet oxygen of lutein and five times the ability to repair the α-tocopheryl radical cation. Whether these effectiveness ratios apply *in vivo* is not known, but it is interesting to see that L and Z are not equally distributed across the retina. In the fovea the ratio of L concentration to Z concentration is 0.7 and about 1.3 in the outer macular zone and higher still in the retinal periphery (Figure 6a). Indeed, L and Z occur in many retinal tissues but in much smaller amounts than in the fovea – free radicals are not only produced by the interaction of radiation and tissues, but are formed as by-products of normal cellular metabolism, and all cells contain systems to mitigate against the destructive actions of these radicals.

The interest in the antioxidant properties of L and Z in MP arises because of laboratory experiments which show that prolonged exposure to light can induce damage to the retina and that the damage can resemble certain aspects of Age-related Macular Degeneration (AMD). Epidemiological research has suggested many factors that might predispose a person to AMD (Evans, 2001) but there is no universal consensus on all of these. One factor that the lab light-exposure experiments point to is chronic exposure to light, especially blue light and UV radiation. Oxidative stress is high in the retina, especially so in the fovea where the metabolic rate and the oxygen tensions are high, and where the incident light is most intense and there is a plethora of PUFA'S awaiting peroxidation (Beatty *et al*, 2000; Marshall, 1985). A good supply of carotenoid pigment in the macula would be a useful sight-preserving component to have throughout life to inhibit the slow destruction of the retinal cells. The idea that macular pigment is protective to retinal function (Haegerstrom-Portnoy, 1988) and AMD (Snodderly, 1995) is now firmly established but not at all confirmed.

Although epidemiological studies (Taylor *et al* 1992; Cruickshanks, Klein & Klein, 1993) have shown that a history of exposure to strong sunlight is associated with an early onset of AMD, the effect is smaller than might be supposed from the very definite laboratory results that show that too much light of normal daylight intensity given over hours or days is harmful. However, associations between visual impairment and the amount of solar radiation in the subject's locality may be seen even in the UK. Figure 7 plots, county by county, the percentage of visually impaired people (corrected for the size of the local cohort of elderly) against the latitude of the county town. The dashed line shows how the solar

**Figure 5** The outer segment of a retinal rod that was exposed to white fluorescent light for six hours. The first stages of light damage are visible where the ordered membranes of the discs in the rod outer segment (the photosensitive part of the rod) is broken down presumably by lipid peroxidation.

constant varies with latitude. These data are crude and open to criticism (the visual impaired figures include all impairing conditions and not just AMD), but they are suggestive and point up another good reason for living north of Potters Bar.

The situation for oxidative stress and light exposure in the eye is such that it might be sensible to err on the side of caution and, until it is proved otherwise, assume that there is a connection between light exposure history and AMD. Thus it would be worthwhile knowing if you have a high concentration of MP and, if not, to increase it. This would mean eating more L and Z in your diet – and, just as importantly, improving your life style by – yes, you guessed it – not smoking or drinking and keeping out of the sun, sun beds and tanning salons. MP levels can be measured fairly easily with small portable instruments that are just emerging from development (Mellerio *et al*, 1998; Wooten *et al* 1999) so screening is now possible.

Dietary intake of L and Z can be increased by eating more of the appropriate vegetables or by taking supplements. There are important questions about which supplement to take and how much, and whether this is safe and effective. A number of studies (Landrum, Bone and Kilburn, 1996) have shown increases in MP when the diet is supplemented with L but as L is mainly found outside the foveal centre (Figure 6), would supplementation with Z be better? So far only one pilot trial with Z supplementation has been reported (as poster at a meeting), but there is some evidence from elsewhere that L might be converted into Z in the fovea (Landrum and Bone, 2001). It was known that the distribution of MP across the macula, although radially symmetrical, may have wide or a narrow spread and this has recently been demonstrated nicely (Figure 6b) by van Kruijk *et al* (2001). It is an open question whether supplementation would widen the distribution or raise the peak value and what would be the best supplementation regime to achieve either or both effects.

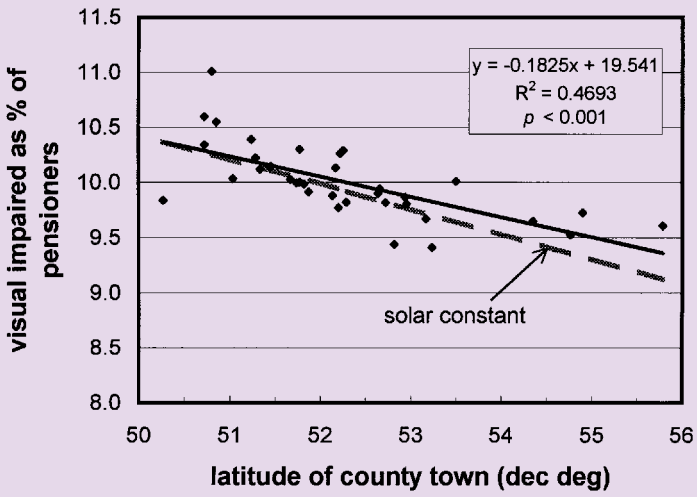


**Figure 7** The number of people with visual impairment, plotted as a percentage of the over 65s, county by county, versus the latitude of the county town. The fitted line shows a significant and large correlation. The dashed line is the solar constant versus latitude, scaled to fit the visual impairment data at latitude 50 degrees, 20 minutes.

Even though the 'protection of MP against AMD' theory is attractive, it needs to be proven. Beatty *et al* (2000) have measured MP values in AMD patients and shown they had less pigment than age matched normals, but the measurement is open to criticism. It was made using a psychophysical technique called heterochromatic flicker photometry which assumes that there are the same relative number of M and L cones in the fovea, where there is pigment, and outside at a comparison position where there is no pigment. In patients with AMD, this is not certain – indeed it is unlikely. And there is also the objection that it may not be low MP that leads to AMD – it may be that AMD causes so much retinal dysfunction that MP is lost and all that is measured is the progression of another facet of the disease. A similar relationship was found by Landrum *et al* (1999) when they measured MP levels in enucleated normal and AMD eyes by HPLC. But, as these authors state, an association does not necessarily reflect a causative relationship. The situation is complex and there are several confounding factors, e.g. age and race (Mare-Perlman *et al* 2001), to name just two.

What is required is a properly controlled longitudinal study that runs for about thirty years. Some of us with grey hair can't wait that long, hence the need for a time machine to do in two years what nature would normally do in thirty. Does anyone know where I can get one?

**John Mellerio**
*School of Biosciences*
*University of Westminster*

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*continued on page 16*

COMMENTARY

# The Clinical Academic – The Clinical Scientist

Those of you who think that life is hard being a scientist nowadays are unlikely to give much thought to clinicians who have academic aspirations (overpaid, in the way, uneducated and always in a hurry). Nevertheless, there has been a minor crisis in academic medicine in the past few years. A major reorganisation of postgraduate training for clinicians, called 'Calmanisation' (after the then Chief Medical Officer of Health), has been introduced. Effectively, this gives a tight structure for the training in all the medical specialities for the 5-6 years leading up to consultant grade (i.e. the specialist registrar). It has had the benefit of improving the standards of training for many clinicians but has had the unfortunate effect of inflexibility. Thus many clinicians who might have wanted to "dip their toe" into scientific research are often discouraged from doing so. Certainly if they spend more than a year out of their training scheme the perception is that they have great difficulty getting back in. This has resulted in poor recruitment into Academic Medicine in its broadest sense, and there is great concern that it would lead to an erosion of the research base in clinical medicine and to a lack of scientific leadership in the next generation. The problem has been recognised by the powers that be and following several reports, most importantly the Saville Report, a proposal has come to fruition whereby nationally there will exist 50 clinician scientist posts. Funding for the posts will come jointly from the MRC, the Wellcome Trust and the Department of Health. They will be held for 10 years by each individual and the idea is that it will give them some sort of security whereby they will obtain a PhD interdigitated with the training in their particular clinical discipline. After 5 or 6 years in training these individuals would be at senior lecturer level and would continue in their research area for a further 4 to 5 years in their institutions.

Fifty places is not a large number and the competition for these posts is likely to be fierce. Physiology is the most important subject which underlies the practice of Medicine (albeit that not many clinicians recognise it!) so there is an opportunity here for Physiology Departments to develop research projects and collaboration with this old species under a new guise – the academic clinician or clinical scientist.

**Dafydd Walters**
*Department of Child Health*
*St George's Hospital Medical School*

**Wanted – a time machine** *continued…*

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# Octopamine is not just for arthropods

**Up till recently octopamine appeared to be a purely arthropod neurotransmitter. Here Chris Elliott and Ágnes Vehovszky demonstrate that it also occurs in the *Phylum Mollusca*, and may occur elsewhere.**

Chris Elliott

Octopamine has been well documented as a transmitter, modulator and hormone in both crustacea and insects, (for review see Roeder, 1999), and it has provided a target for the development of at least one commercial insecticide (Amitraz, NOR-AM Chemical Company, Delaware, USA). However, we have now shown that octopamine is a major transmitter and modulator in a different phylum, the molluscs, where it plays a major role in feeding.

The octopamine antagonists known to be effective in insects block the normal feeding response of intact snails (*Lymnaea stagnalis*), with the most effective antagonists, phentolamine and epinastine, having the strongest effect. One possible explanation for this observation would be the presence of octopaminergic cells in the feeding system and this we have been able to demonstrate.

## Octopamine as a transmitter in the buccal ganglia

HPLC shows that the buccal ganglia, which contain about 400 cells and control feeding, have the highest concentration of octopamine, which is contained in just 3 octopamine-immunoreactive neurons (Elekes *et al*, 1996; Hiripi *et al*, 1998). These interneurons are homologous and arborise solely within the buccal ganglia (Vehovszky *et al*, 1998). Electrophysiological recording shows that these OC interneurons make synapses with all the known members of the feeding network. Detailed analysis of the inhibitory synapse from the OC interneuron to the B3 motoneuron shows that the connection is very effectively blocked by the octopamine antagonists phentolamine and epinastine. These also block the hyperpolarising response of the B3 motoneuron to application of octopamine from a small pipette (Figure 1). Together with saturating binding of octopamine, these observations demonstrate that octopamine is acting as a transmitter in this system.

Many of the octopaminergic synapses are biphasic. Among these are the OC → N3 interneuron synapses where the inhibitory octopaminergic chemical synapse is combined with a faster electrical synapse (Figure 2). This means that the effect of the synapse is very dependent on the initial membrane potential of the postsynaptic neuron. At rest, the membrane potential is close to the reversal potential of the chemical synapse, so the dominant effect of the synapse is excitatory. If however, the N3 is already active, the electrical connection is much less effective, and the inhibitory component dominates. This part of the network is further complicated by the fact that the N3 interneuron makes a similar, non-octopaminergic synapse back onto the OC interneuron with both inhibitory chemical and electrical components (Figure 2). Similar complex synaptic arrangements have been described in other central pattern generators, including the stomatogastric ganglia of crustacea (Eisen and Marder, 1984; Evans *et al*, 1999) where they provide a means of tuning the pattern. This would be important in our *Lymnaea* feeding system too, because the OC

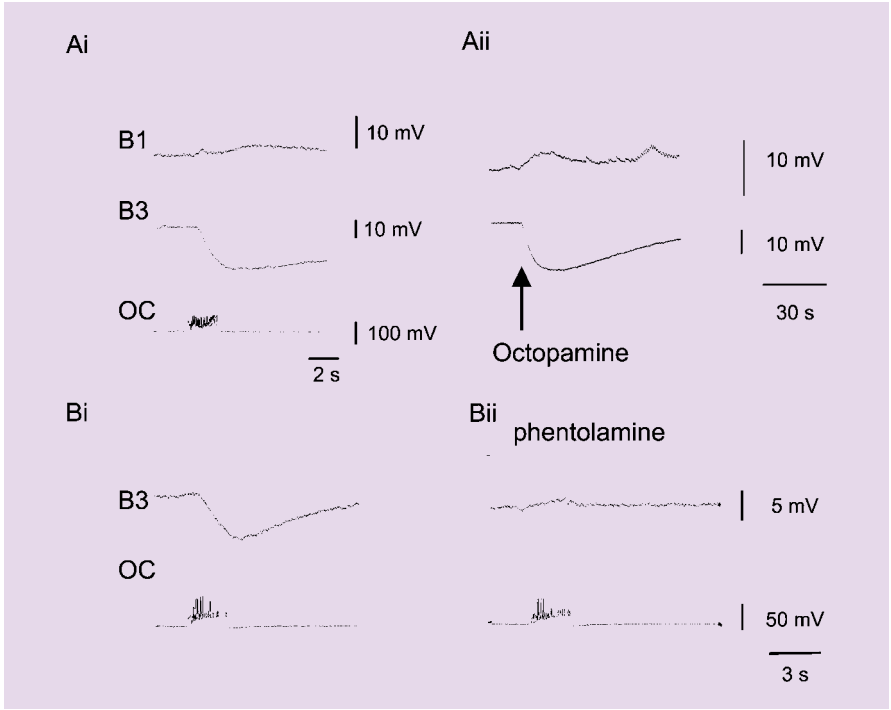


**Figure 1** Octopamine is a transmitter in the snail *Lymnaea*. Stimulation of the octopamine immunoreactive OC interneuron (**Ai**) is mimicked by local application of octopamine (**Aii**), with hyperpolarisation of the B3 and depolarisation of B1. Phentolamine, well known as a blocker of octopamine in insects, blocks the effect of OC stimulation at a concentration of 10 micromolar. See Vehovszky and Elliott (2000a), for details.

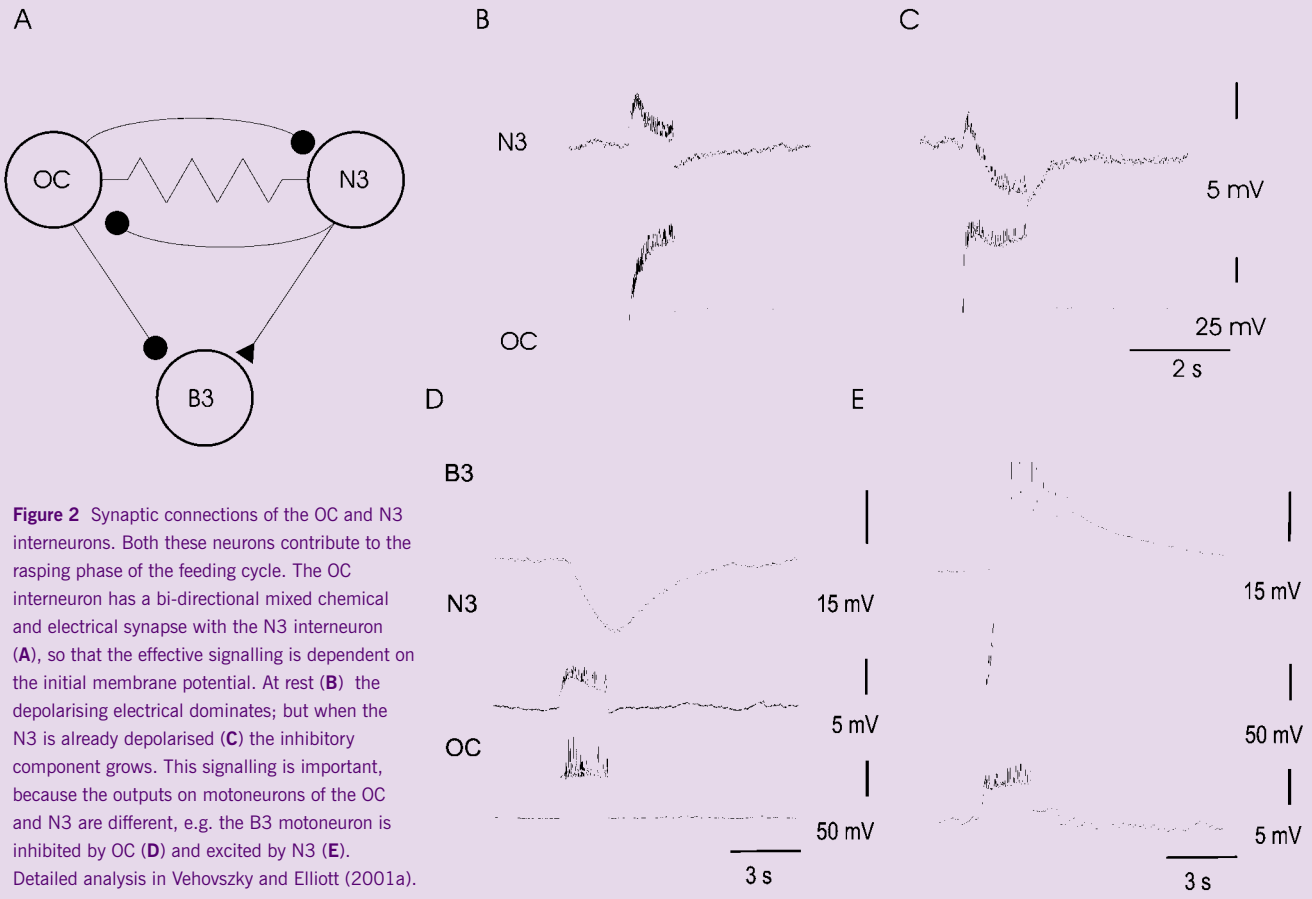


**Figure 2** Synaptic connections of the OC and N3 interneurons. Both these neurons contribute to the rasping phase of the feeding cycle. The OC interneuron has a bi-directional mixed chemical and electrical synapse with the N3 interneuron (**A**), so that the effective signalling is dependent on the initial membrane potential. At rest (**B**) the depolarising electrical dominates; but when the N3 is already depolarised (**C**) the inhibitory component grows. This signalling is important, because the outputs on motoneurons of the OC and N3 are different, e.g. the B3 motoneuron is inhibited by OC (**D**) and excited by N3 (**E**). Detailed analysis in Vehovszky and Elliott (2001a).

and N3 interneurons have opposite effects on the motoneurons, including the B3 neuron (Figure 2).

## Octopaminergic modulation of feeding

About one third of isolated Lymnaea CNS preparations produce a rhythmic pattern similar to the sequence of activity seen during feeding in the intact snail. This pattern, know as fictive feeding, is modulated by stimulating the OC interneuron. Initial experiments showed that stimulating the OC interneuron during fictive feeding stabilised the feeding rate, so that slow rhythms were accelerated and fast ones slowed down (Vehovszky and Elliott, 2000). However, examination of the feeding pattern shows that the pattern is also reconfigured. The changes include removal of the B3 motoneuron from patterns in which the OC interneuron is active and shifts in the timing of the rhythmic pattern (Figure 3A) (Vehovszky and Elliott, 2001a).

Subsequent experiments in quiescent preparations showed that stimulating the OC itself could elicit fictive feeding. Unlike all previous neurons described in molluscan feeding, the response to the OC interneuron did not occur during the period of stimulation, but 3-4s later. Furthermore, the pattern may continue for many feeding cycles (Figure 3B). This effect can be partially explained by the biphasic synapses made between the OC interneuron and the premotor interneurons (SO, N1; Vehovszky and Elliott 2001a).

In addition to the ability of the OC interneurons to stabilise, reconfigure and activate the feeding network in a polycyclic manner, the OC interneurons may also modulate the effectiveness of other modulatory feeding interneurons, like the SO, which drive fictive feeding for as long as they are depolarised. Stimulating the OC 4-10s before stimulating the SO significantly improves the response to SO depolarisation (Elliott and Vehovszky, 2000). Here again, it is characteristic that the modulation is polycyclic, i.e. it lasts over several feeding cycles. This mechanism may contribute to the persistence of the feeding behaviour of intact snails after the feeding stimulus has terminated.

A possible cellular mechanism for the modulatory effect of the OC interneuron on other feeding connections is heterosynaptic facilitation. In particular, it may modulate the synaptic connections between the modulatory SO interneuron (which triggers feeding) and its followers, including the excitatory synapses with pattern-generating N1M protraction phase interneurons (Vehovszky and Elliott, 2001b). Thus preceding OC activity increases the ability of SO to trigger feeding pattern. When the feeding pattern is on (but does not reach its maximum rate), the longer-lasting modulatory effect on protraction phase interneurons further increase the rate of the feeding rhythm.

Thus the modulation of the

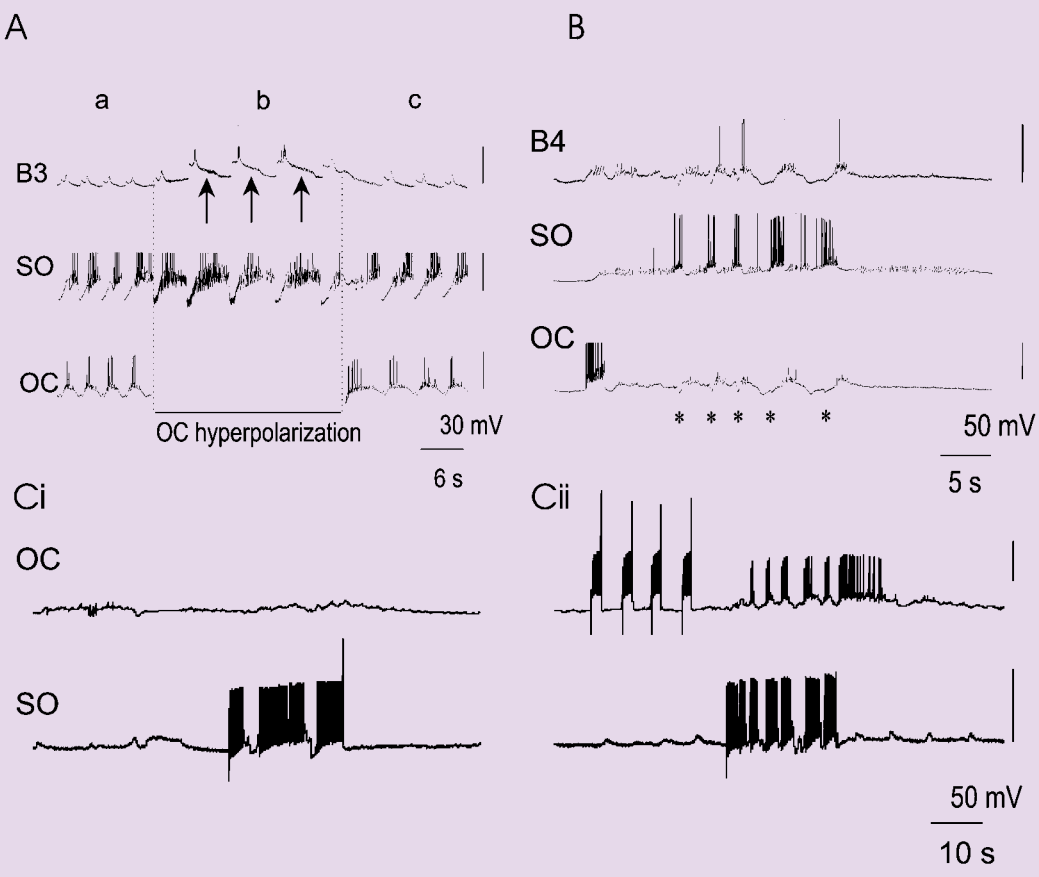


**Figure 3** Polycyclic modulation of rhythmic fictive feeding by the OC interneuron.
**A** The OC reconfigures the feeding pattern, eliminating activity in the B3 motoneuron, which controls gut activity.
**B** The OC activates feeding, but only after the end of the stimulus.
**C** Activation of the modulatory SO interneuron evokes slow feeding (**Ci**). Prestimulation of the OC increases the feeding response to the same stimulation of the SO (**Cii**). Each pause in the activity of the SO represents one rasp.

A & B modified from Vehovszky and Elliott 2001a, C from Elliott and Vehovszky (2000).

molluscan feeding network by octopaminergic neurons has many exciting aspects, and definitely supports the idea, that octopamine is not just for the arthropods. A wider significance for octopamine is suggested by the recent report from an annelid, the leech, for a significant role for octopamine (Mesce *et al*, 2001). The renewed interest in octopamine in vertebrates (Borowsky *et al*, 2001; Sherman and Chole, 2001; Rudling *et al*, 2000) implies that work on simple, but easily accessible molluscan systems will continue to be important.

**Chris Elliott**
*Department of Biology*
*University of York*
**Ágnes Vehovszky**
*Balaton Limnological Institute of the Hungarian Academy of Sciences*

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## Acknowledgements

We should like to thank BBSRC and The Wellcome Trust for their support.

# Use it – don't waste it: Facilitative urea transporters

**Craig Smith explains why transport of urea across cell membranes plays many important roles in cell physiology –as well as some unexpected ones.**

Craig Smith tests out his own physiology

Urea is probably best known as the major end-product of amino acid breakdown in mammals. As a result of this, urea is often considered to be purely a waste product of metabolism. However, between 50-70% of the urea filtered by the kidney is actually reabsorbed, and urea plays important roles in mammalian water, and nitrogen, balance. Central to both these roles is regulation of the movement of urea across cell membranes.

Precisely how transmembrane urea movement is regulated has puzzled physiologists on and off since the pioneering work of Homer Smith in the 1930s. For many years it was widely believed that urea permeated membranes simply by lipid phase diffusion. However, this did not explain the high urea permeability of erythrocytes, or the fact that vasopressin stimulated a large increase in urea permeability in the kidney inner medulla. Indeed, the membranes of inner medullary cells, even in the unstimulated state, have a basal urea permeability much higher than can be attributed to lipid phase diffusion.

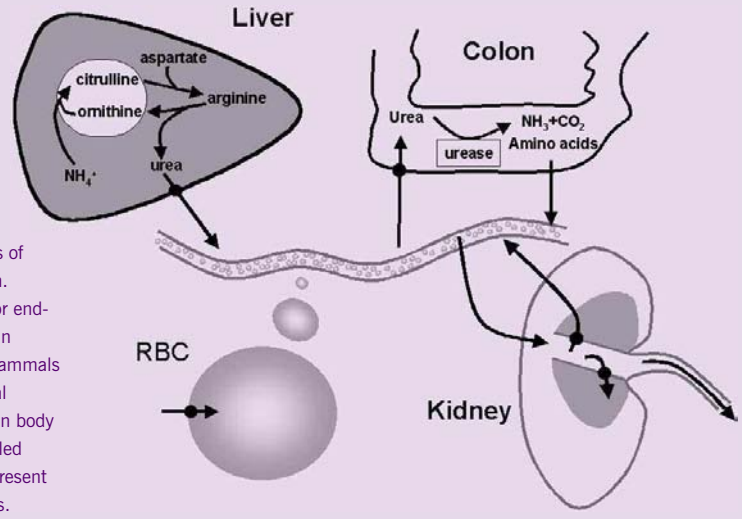


**Figure 1**: Routes of urea metabolism. Urea is the major end-product of protein catabolism in mammals and plays several important roles in body homeostasis. Filled black circles represent urea transporters.

The isolation of a cDNA encoding a mammalian urea transporter protein in 1993 put an abrupt end to this debate and opened up a new field of solute transporter biology (You et al. 1993). This unique protein, termed UT-A2 (´Urea Transporter`), turns out to be a facilitative transporter, which acts, in effect, as a selective pore facilitating the diffusion of urea. Using homology screening techniques a family of urea transporters have now been characterised (see Smith & Rousselet 2001). All the urea transporters are the products of two closely related genes, UT-A and UT-B. Family members have now been detected in mammalian, elasmobranch, teleost and amphibian species.

## Tissue distribution of urea transporters

In mammals the urea transporters show a wide tissue distribution. As predicted by functional studies, they are highly expressed in kidney, more precisely in the inner medullary collecting duct, and in parts of the thin descending limbs of the loop of Henle. Here the urea transporters are part of the so-called countercurrent multiplier, functioning to generate and maintain the high urea concentration in the medullary interstitium which powers water reabsorption. The capacity to harness urea as an osmolyte to drive water reabsorption across the kidney collecting duct must have been a significant evolutionary advance, allowing animals to leave the aquatic biosphere and exploit terrestrial habitats. Interestingly, elasmobranchs, which includes sharks, rays and skates, also use urea as an osmolyte, but not to concentrate urine. These animals have a plasma and tissue urea concentration of ~400mM,

compared to 4-10mM in human plasma. This high urea concentration, in combination with NaCl, serves to raise the plasma and tissue osmolality to equal the 1000mOsm of the surrounding sea water. In this way elasmobranchs avoid the osmotic stress experienced by their bony teleost cousins, which maintain their internal milieu at 300mOsm.

## Red Cells

Erythrocytes express UT-B transporters and some insight into the physiological role of this protein has been gleaned from studies involving humans with mutations in the UT-B gene. One genotype, known as *Jk*$^{null}$, results in a total lack of UT-B function, yet *Jk*$^{null}$ individuals show no adverse symptoms. Their sole abnormality is that they cannot concentrate their urine to the same degree as people with functioning UT-B. This leads to the hypothesis that UT-B expressed in red cells, acting in concert with UT-B expressed in the kidney vasculature, contributes to the generation and maintenance of the high renal medullary interstitial urea concentration.

## Liver

Urea is synthesised in the liver so it is not surprising that both UT-A and UT-B urea transporters are expressed in this tissue, where they are thought to provide a means of egress for newly synthesised urea into the circulation. Interestingly, an aquaporin water channel which is also permeable to urea, Aquaporin-9, is also expressed in liver. This protein may play a dual role as a diffusional pathway for both water and urea.

## Urea, There, Everywhere

Expression of urea transporters in kidney, erythrocytes and liver was expected, given the role of these tissues in urea handling (Fig. 1). However, urea transporters have also been shown to be expressed in many tissues not associated with urea metabolism, including colon, testis (e.g. Fig. 2) and brain. In colon there is strong evidence in ruminants that intestinal breakdown of urea by resident microflora helps maintain nitrogen balance. We have found urea transporters expressed along the mouse gastro-intestinal tract, raising the possibility that the same may be true in monogastric animals. If this turns out to be the case, then this mechanism may be important in people who consume a diet low in protein (which includes most of the third world), during illness when ingestion of food is disrupted, or during pregnancy when nitrogen demands are increased.

In testis the picture is less clear. We have found that urea transporter expression is co-ordinated to the spermatogenic cycle, implicating urea transporters in this process. However, there is little in the way of solid data to indicate what role urea transporters may play in this process. Urea is a by-product of the biogenesis of polyamines. Because the polyamines spermine and spermidine are important for DNA packaging, urea transporters may be required for removal of urea from the testis following the polyamine synthesis that accompanies DNA replication and packaging.

Another intriguing possibility is that urea transporters have other functions in addition to transporting urea. Ideas which remain to be fully tested include that they may transport other solutes, or may even have a dual role and function as something other than solute transporters. One hint of the latter is the finding that human UT-B complements the fission yeast (*Schizosaccharomyces pombe*) *rad1-1* cell cycle checkpoint mutation. Curiously, when overexpressed in a human cell line, UT-B induces apoptosis. It is difficult to explain these results strictly in terms of urea transport by UT-B, suggesting that UT-B may have a distinct function that is independent of urea transport. However, given that *Jk*$^{null}$ individuals are normal, apart from a mild urinary concentrating defect, this function is either non-essential or is made redundant in man by additional compensatory mechanisms.

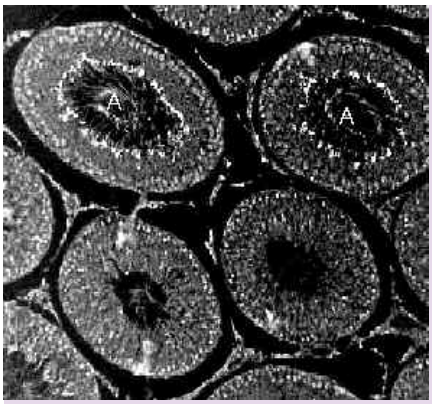


**Figure 2**: Monochrome image of horseradish peroxidase-stained section of rat testis section. Strong staining is seen in residual bodies of stage VIII seminiferous tubules (A). These residual bodies are the "remnants" left behind by budding off of the maturing spermatozoa.

To close, in the past decade the field of urea transporter biology has blossomed resulting in a profusion of molecular data. However, molecular data alone is insufficient to explain the role played by urea transporters in the diverse array of tissues where they are now known to be present. Future breakthroughs in this important field will only come from an integrated approach incorporating molecular and physiological techniques. Which can only be good news for us physiologists.

**Craig P Smith**
*School of Biological Science, University of Manchester*

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COMMENTARY

# Ethics of Working with Human Tissues

Several physiologists from around the country have expressed concern about the varying advice they have received from Local Ethical Research Committees (LRECs) over whether consent is needed when human tissue is collected for research at operation, after death or from the products of conception. Professor Terry Stacey, Director of the Central Office for Research Ethics Committee (COREC) of the NHS, is aware of these problems and informs us that a new Research Governance Framework is to be released shortly which will help to standardise procedures and reduce variability.

The use of human tissue for research purposes has become a sensitive issue recently at least in the media is perception of the public's view and in the public's eye, following the problem of retained children's organs particularly at Alder Hey Children's Hospital. The consequence of this attention must be that if researchers are in any doubt about their position then it is safer to get consent to work on any human tissue. As is usually the case in physiological studies which are exploring fundamental mechanisms the results of the experiments are not directly relevant to the patient. In this case, if the tissue is "anonymised" then it may well be possible for it to be obtained without consent. However, the LREC should be approached in all cases for detailed advice.

There are several websites which give guidance on this issue and the best one is probably from the Medical Research Council. Recently, they have formulated a straightforward and clear document which can be downloaded from the web and it contains a model consent form which is very useful. The General Medical Council website is also easier to negotiate than some of the others.

**The website addresses are:**

http://www.mrc.ac.uk/ethics_a.html Medical Research Council
http://www.gmc-uk.org General Medical Council
http://www.doh.gov.uk/consent/refguide.htm Department of Health
http://web.bma.org.uk/ethics.nsf British Medical Association
http://www.rcpath.org/activities/publications Royal College of Pathology
http://www.rcpcph.ac.uk Royal College of Paediatrics and Child Health

A tip for researchers working on tissues which is collected from FOUR OR MORE sites and for which consent is required, is that an application need be submitted to only one committee – a Multi Centre Research Ethics Committee (an MREC). This is a regional committee. Subsequently the protocol need only be submitted to the LRECs for their rubberstamping. (It should be noted however that some LRECs can reject the application totally but cannot alter it.)

**Dafydd Walters**
*Department of Child Health*
*St George's Hospital Medical School*

Sixth-form pupils from Jordanhill School (top) and St Thomas Aquinas School (bottom) get some hands on experience at testing the limits of human physiology.

## Pupils flex their muscles – physically and intellectually
### Sixth-form workshop at the University of Glasgow

In a full day of lectures, workshops, and debates, secondary school science pupils from around Glasgow enjoyed an introduction to Physiology at the University, one of many events arranged under the auspices of the British Association Festival of Science, and sponsored by the Physiological Society.

S5 and S6 students learned about the physiology of exercise, and brought the science to life in practical workshops.

Catching her breath after strenuous exercise in one of the experiments, Ailish Murray (currently in her sixth year at St Thomas Aquinas School) said, "I had no idea what Physiology was about until I came here today. I knew I wanted to study science, but I'm now sure that Physiology is the area to want to specialise in."

The eighty pupils also heard about "Careers in Physiology" and took full part in a passionate debate about the use of animals in medical experiments. Dr Paul Skett, who organised the event, said "This was a chance for pupils from our local partnership schools to see what we do in biomedical sciences and get a feel for whether a university education in this area is for them. Their enthusiasm was amazing and I hope we can continue to put on events of this type"

## British Association Festival of Science
### University of Glasgow, September 2001

The Public Relations and Education Sub-Committee decision that we should organise a workshop for the BA festival of science made me more than a little nervous. Much as I knew of the media importance of the event, I had never myself been and had heard nightmarish scenarios of audiences that comprise merely the other speakers. The theme of the festival was 'Science and Society', and our half-day workshop was entitled 'From Basic Physiology to Understanding Disease'. Four Members kindly agreed to speak and I set about some fairly hard-core marketing to all local schools.

Before our session, I had time to visit two others. Audiences were indeed low. One really rather interesting session on the relationship between GPs and their patients had around 15 people, and another on the public dialogue on science about 20. However, there were a lot of media types if not in the sessions, then wandering around.

The room we were allocated held 140, and I was delighted to see that it was nearly full when we started, and indeed by the time all the stragglers had got in there were people standing at the back and sitting on the floor. There was also great variety – lots of school children, a good turn out from the local department and members of the public. Professor Clive Orchard got us off to a great start, with a talk entitled 'Current Affairs of a Broken Heart'. Clive was jet-lagged having recently got back from New Zealand, but did an astounding job – the audience lapping up all the movies they would never see in their classrooms. A heart attack came to life in a way it never had for me before, the extra nuggets of information filling in the gaps from what one learns from textbooks. Professor Alan North then took over to talk about membrane pores and their relationship with disease. Alan gave a historical introduction to the world of channelopathies, and promoted physiology as a really interesting and fast moving area to be researching at the moment.

After coffee, Professor Barry Argent continued the theme with a discourse on cystic fibrosis, highlighting the promising approaches for therapies and putting into perspective the advances made in genetics. We finished with something rather different – a talk on neural decisions and freewill by Dr Roger Carpenter. Working at the boundaries of psychology and physiology, Roger cheered us up by demonstrating the importance of procrastination in responding to a stimulus. I was particularly glad we had this talk as it demonstrated the range of options available to a research physiologist.

All in all, we had a very successful half-day. All the speakers had more questions than they had time to answer, and two of them were asked to attend a press conference. The feedback from the audience that I heard was all positive, and the speakers, to whom I would like to extend thanks on behalf of the Society, said they enjoyed themselves. We were also involved with a session on animal experimentation in conjunction with other UKLSC Societies. If you would like to read a report of that session, please see the Animal Science page of the UKLSC website, at www.lifesci.org/asg. Next year, The Festival will be at the University of Leicester with the theme 'Science and the Quality of Life'. We shall be running a session on old age, and if anyone would like to be involved please contact me as soon as possible.

**Maggie Leggett**

## Affiliate Questionnaire

In June, we conducted a survey of our Affiliate Members. Rather than an attempt to segregate them from the rest of the membership, it was aimed to review the success of the various schemes particularly aimed at Affiliates, and was timed to coincide with the recent inclusion of Affiliate Members on Council (congratulations to Richard Helyer and Giles Best on their election).

106 Affiliates answered the survey, representing over 15% of the total active affiliate membership which is reasonably pleasing for a survey of this nature. The answers by and large were encouraging, general comments were almost all positive and apparently we compare favourably with other Societies with which Members are involved.

One area of concern was the lack of knowledge by some about the schemes we offer. Whereas 86% were aware of the Affiliate Travel Grant, less than half the respondents knew about Dale and Rushton grants and a miserable 16% were aware of Techniques Workshops. In response to this, we have updated both the Affiliate Handbook and advertising material, and as *ad hoc* emails were preferred as a means of advertising events, we shall be working on our email list to ensure coverage.

Of the events specifically for young scientists, the Young Physiologist Symposia are the most long standing and enduring. The comments on these events were particularly useful. By far the greatest reason for non-attendance was the lack of a meeting in a suitable scientific area, and so we will encourage more wide-ranging themes. There were also a few comments relating to abstract publication, which is an area in which we can look into. Prizes are favoured and we will certainly take on board the suggestion that prizewinners should be given greater publicity within The Society.

Only a small percentage of respondents had attended a techniques workshop – although this is hardly surprising as the 'hands-on' nature limits the number of places. We will be looking at the techniques requested in the light of next year's planning.

Almost all of those responding read the Magazine, which is particularly pleasing for the Editor! We ran a series of careers articles a couple of years ago, and as they were requested again we shall be looking into interesting careers to cover. I hope Kirsty Urqhart's article in the Autumn issue was of use in this regard. I also liked the suggestions that we have a 'tips for PhD students' page on the website, to include advice on job hunting and career planning.

This was a successful process which we shall repeat biannually at least. In the meantime, as an Affiliate or full Member, if you have any comments about current initiatives or areas where you feel the Society should be involved, I would be pleased to hear from you.

**Maggie Leggett**

## Benchmarking and the New Method for Academic Review

In September, the Learning and Teaching Support Network (LTSN) held a workshop on benchmarking and the new method of academic review. Many of you may know that The Society has been quite active in the benchmarking arena, and through the Higher Education Sub-Committee has both generated a benchmark for physiology (available on the Members News page of the website), and commented on the draft bioscience and nursing documents. As there is still a question mark over exactly how we might use the document kindly produced by Members Rob Clarke and David Sanders, this workshop was particularly timely.

The LTSN had invited Professor Gus Pennington, the Chief Executive of HESDA, to explain the probable future of academic review. He began by explaining the goals of academic review – accountability, better public information and quality assessment. He stressed that all universities have quality assessment; it was the use to which the data was put that was important. He added that the government wants the Higher Education sector to be self-regulating once confidence is established.

Subject review will remain for the foreseeable future, but may be broadened into thematic review across an institution (for instance, something like assessment may be reviewed throughout the Institution rather than in individual departments). He also touched on the problems institutions were having with the self evaluation documents, and suggested that their answers to questions should be upbeat, short and well-referenced. External examiners and students should be encouraged to give positive feedback as well as constructive criticism. Reviews will be set over 5 or 6 weeks, but within this period reviewers will only have 4 or 5 days for a particular assignment. This means that strengths must be pointed out quickly and well documented, so that the maximum amount of time can be spent on areas of concern. Academic standards will be judged on a single standard of 'confidence' or 'no confidence' (it was pointed out that occasionally 'limited confidence' may be used, this was not a half way house, but indicated confidence in one area but not another). Separate judgments can be made for single programmes to allow increased precision.

There were several among the audience who had acted as reviewers, who pointed out that the single judgment of 'no confidence' would be difficult to

make in the certain knowledge that it would affect funding. Professor Pennington replied that there was concern over provisions in some institutions, and the government would not be unhappy with a very small percentage failing.

An integral part of subject review is of course compliance with the appropriate benchmark. The afternoon of the workshop was devoted to discussing these statements in groups. Simon van Heyningen, chairman of the Biosciences Group, took us through the creation of the bioscience document. He explained that the idea was generated from the Dearing Report, and that the statements would be used in programme design and validation, academic review, external examining and informing other academics, employers and the public about the realistic expectations from a graduate in the discipline. The statement should be able to answer the 'key questions', set by QAA, concerning graduate attributes and capabilities and the minimum standards necessary to obtain an honours degree. No other degrees were considered, and equally there was no provision for those taking joint honours.

A document produced in 1997 by the Institute of Biology and the Biochemical Society on the core attributes of biological science graduates provided the group with a good starting point. It was generated with the maximum possible consultation periods, and the final version will be available in January on the QAA website, www.qaa.org.uk. (Some Members of the Society expressed unease about the lack of a physiologist on the group. However, it was agreed that the document was actually quite useful, and was sufficiently generic to cover Physiology degrees. The Society did reply during the first consultation period, with a few minor details.)

The main part of the discussion concerned the requirements of the third year project. While in some subjects, computer or library-based projects were acceptable, in others they were not and the benchmark needed to reflect this diversity. A query raised by one of our Members during the consultation period regarded the lack of an 'excellent' specification. Simon replied that this was not part of QAA's initial directive, nor was the benchmark to be used to replace Institution examination committees. There were also several questions about the need to meet benchmarks in all modules taken, particularly where a student intermits or fails a specific module whilst passing the rest. In answering this, it was pointed out that although the aim of benchmarking was not to alter teaching in the majority of institutions, some may have to revisit their criteria for giving a student a 3rd class honours degree. Echoing a comment made earlier in the day, he suggested that the government would actually not be unhappy if some more students were not granted degrees, owing to failure to meet the benchmark.

The future of our own document remains uncertain. In selecting groups of subjects, the process has been started from the middle rather than the top (generic graduate benchmarks), or bottom (individual subject benchmarks), but there is no current move on the part of QAA to extend in either direction. Should there be, our document would be useful, but currently it will have to remain as a Society recommendation rather than a QAA approved statement.

**Maggie Leggett**

# Young Physiologists' Symposium

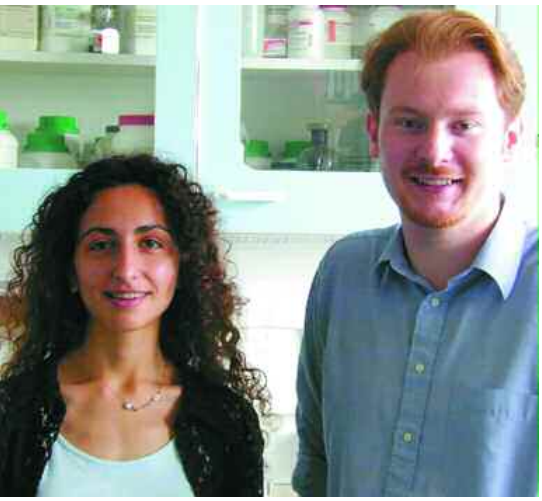
## "The Excitement of Excitable Cells"

University of Oxford, December 16-17th 2000

The weekend before the Society's meeting at King's College London last year, the Department of Physiology at Oxford hosted it's first Young Physiologists' Symposium. 40 graduate students and young postdoctoral researchers attended the event. They came from Universities around the UK as well as from as far afield as Belgium and Italy. The event was generously funded by the Physiological Society and Leica Microsystems, which enabled us to pay for travel expenses and accommodation and to have an excellent Symposium dinner in Keble College on the Saturday evening.

The topic of the two-day symposium, "The Excitement of Excitable Cells", was chosen as an area in which the Department excels, namely cardiac and neuroscience. Professors Denis Noble and Colin Blakemore gave keynote lectures on the mathematical modelling of the heart and cortical neuronal differentiation respectively, which were very well received. The Symposium started on the Saturday morning with a microscopy workshop by Leica. Participants were split into groups and spent half hour sessions learning how to use different types of microscopes (including a confocal one). Afterwards there was plenty of time to get some "hands on" experience with the equipment. The rest of the Symposium was devoted to ten-minute Physiological Society-style presentations given by each and every delegate. The six sessions were chaired and run entirely by young physiologists.

Here, Neil Herring, a third year PhD student and co-organiser of the meeting, and Patrizia Camelliti, an Italian student in the first year of her PhD, give their opinions on the Symposium.



## What's the point of...

### Neil... organising a YPS?

NOrganising an event of this size should be hard work, but it was (most of the time) good fun and certainly quite an experience! I had lots of positive feedback afterwards, which made it very rewarding as well. Also, I do now appreciate much better how meetings are run, and believe that this will benefit me in future.

Obviously, things don't always go according to plan and I got to improve my last-minute improvisation skills. One of the hiccups was related to the fact that the departmental elevator must have shrunk between my confirming its dimensions with Leica and them attempting to get their confocal microscope into it!

All in all, I equally enjoyed preparing and participating in the meeting. Should you get the chance to be involved in organising one – take it.

### Patrizia... attending a YPS?

PSince I am a first year PhD student I had never given an oral presentation in the past. Can you imagine my panic? But the audience was made up of students who all had to give talks and my Italian supervisor was not there, so the atmosphere was veryrelaxed. Nobody asked me questions that were too difficult! Everything went well and even my accent was well understood!

I also had the opportunity to attend many talks given by other students, covering a wide range of different scientific subjects and to ask questions, without the fear of them being considered 'stupid'.

The social part of the meeting was also excellent and everyone seemed to have a good time. For me it was a really great experience!

### What were the presentations like that others gave at the YPS?

NI was really impressed by the standard of the presentations, and the excellent time keeping of almost all delegates. A senior scientist who attended several talks made the comment afterwards that perhaps it would be better to organise 'Old Physiologists Symposia' instead, if they were supposed to teach how to give Phys. Soc. style talks! However, this was the first time many PhD students (including, to my surprise, some third years) had given a talk. I think we could all do with more practice giving oral presentations, especially before presenting for the first time to a main Physiological Society meeting.

PThe talks in general were of very high quality and about different scientific topics, but using similar experimental techniques. Only a few of them ran overtime. It was clear that we all put a lot of effort into organising and practising our presentations. I personally found it difficult to prepare a short *and* clear talk, but it was good training!

I noticed that there were not many questions after some of the talks, so we probably need to learn to ask questions, too. The YPS is a good place to do that.

### Did you get any useful feedback on your research?

NI think most of us got useful feedback, either during the questions, or chatting to people afterwards. There was, perhaps, a lack of discussion after some talks. I found it quite a challenge to ask questions of other people's work, and session chairs sometimes moved on to the next communication a little too quickly.

Also, feedback on research was not limited to the actual scientific project, and there was certainly a lot of feedback on the challenges of being a PhD student.

PI had the opportunity to discuss the techniques and results of my work with other students doing similar things and I got very useful comments. Although the discussion after some of the talks was quite short, we had productive chats at other times, especially during the social events. Also, there are now people I know, whom I would not hesitate to contact in future, so – there was useful feedforward...

### Should faculty staff of the host institution attend?

NHaving one or two 'elders' at each session helped to promote discussions and provided interesting angles on context, significance, or presentation. Obviously, you need to be careful which of the 'senior' people you want to attend (and how many), as there is a fine balance between enlightenment and intimidation.

PSince this is a Young Physiologists Symposium, I think that the number of established scientists should be very low. Otherwise the opportunity to develop our presenting and discussing skills in a relaxed atmosphere is lost.

Faculty staff could be involved in other activities, like giving short introductions about the research of the host department, to give an idea of what is going on, and maybe attract students for post-doctoral research.

**There was no prize for the best presentation. Do you think this was a good idea?**

N We decided before the Symposium not to have a prize for the best presentation. In hindsight, this was a good decision, as it would have been really difficult to choose! I also think, the lack of competition gave people more confidence to present their work.

P I think so, since a competition will introduce stress between the students. I think that a friendly, informal and non-competitive environment is much more productive.

**Should the Physiological Society continue funding YPS?**

N Definitely! Ideally, funding should cover the costs of travel and accommodation, as well as the costs involved in the symposium itself. This encourages cash-strapped students to attend, and supervisors to send members of their group.

Regarding the size, 40 delegates meant 400 minutes of talks over the two days and I suggest that this is pretty much the limit!

P Yes! Because for most PhD students this is the first real opportunity to present their scientific work and to get feedback! Combining a YPS with a main Physiological Society meeting is ideal, since this gives the opportunity to participate in both. After the YPS I went to the main meeting in London where I presented a poster. The YPS was like a training session before the main meeting!

**Do you think you would attend another YPS? If so – what would you want to see repeated/changed?**

N I'm coming to the end of my course, but would love to attend a similar symposium if I went on to do post-doctoral research. It's very useful to present a plan of research before starting a project or present results before attending a major Physiological Society meeting.

I would keep having the YPS close to the big Physiological Society meetings (in time and location).

P Yes. Since I'm only at the beginning of my PhD, these meetings will be perfect training for me to develop my communication skills. I hope that I will soon have some results to present in a future meeting.

I think that both the organisation and attendance were excellent, so why change anything?

STOP PRESS

Have you seen the new version of the undergraduate booklet on animal experimentation? Contact Maggie Leggett (mleggett@physoc.org) for free copies!!

# News from The Journal of Physiology

A week is a long time in politics and a year is a long time in publishing. Hence an update on The Journal of Physiology seems appropriate, and reinforces the close interaction between The Journal and the Society. There are several changes that will be clearly visible when you look at The Journal in January 2002 and others that are less obvious, but probably more important. Other details such as number of papers published, speed of publication and income generated can be found in the Society's Annual Report.

## Journal style

There is lively debate as to whether paper versions of journals will survive. Reasons for abandoning paper copy would include reduction in expenditure, slowness of the process and redundancy with increased electronic availability of the same product. For the moment these arguments are counter balanced by others such as: a reluctance to disenfranchise those readers without electronic access, the advantages of paper copies over electronic versions for transporting, flipping through and reading, and the visual promotion of physiology in libraries and common rooms. The merits or otherwise of all these points can be debated, but the Board decided that it would be premature to abandon the paper copy of The Journal. The number of copies of The Journal sold actually rose last year and sales are predicted to have been maintained in 2001. These sales are a major income stream for the Society; thus the Board's strategy is to do all it can to maintain them (but see below).

Staff from the Society's Publication Office at Cambridge

Back row (left to right): Ann Watson, Mary Wilson, Eleanor Blair, Lydia Grove, Dave Gunn.

Middle row: Caroline Yates, Lynn Jeppesen, Pauline Stevenson, Diana Greenslade Jones, Emma Kelly.

Front row: Linda Rimmer, Claire Varley, May Block, Carol Huxley.

Members of staff not present: Melanie Parkin, Jonathan Goodchild.

The published journal is attractive and this is an important consideration, for both readers and authors. It plays a role therefore, in conjunction with fast publication, a good impact factor, an excellent electronic site, etc. in maintaining the subscription base. It also encourages you, as authors, to submit your best papers to The Journal. To maintain The Journal's attractiveness some changes to its appearance have been made, and will be apparent from January 2002, volume 538.1. These include changing to a more readable font and layout (for both papers and on screen), updating the look, especially of the first page of each paper, and increasing the attractiveness of the Perspectives. Abstracts will no longer be numbered points, as these are confusing in electronic abstracting versions where the points run on. Authors should now structure their abstracts, so that their objectives and conclusions are clearer (Instructions to Authors can be found at www.jphysiol.org/). The Board is also actively considering arranging the contents of The Journal into sections on the back cover. Limited sectioning could make the content more accessible, which in turn will make The Journal more attractive; but agreeing how to sectionalise is not straightforward. Sectionalisation appeared on the agenda at my first Board meeting 6 years ago, but at that time did not find favour! Look at the back cover in 2002 to see which way things went this time.

## Electronic pre-publication, databases and supplementary material

The Journal is available online as both HTML and PDF files via the Highwire Press site; The Journal site has an average of 7000 distinct visitors per week, downloading approximately 3 Gb of data. It is also clear that two recent initiatives, Perspectives and review articles, brought in by the Board in 1996 and 1998, respectively, are

particularly popular, as judged by the downloaded figures. The Journal is also changing its database so that both authors, reviewers and Editors will be able to track the course of manuscripts from submission to publication. Authors already receive their proofs electronically. Further use will now be made of our electronic site to bring in electronic pre-prints – Physiology in Press. The electronic version of an accepted manuscript will be posted on the HighWire site, ahead of print publication, but after copy editing, to ensure the high standards of The Journal are maintained. This will reduce publication delays for authors by at least 6 weeks, bringing publication delays down to just 1–3 weeks. Papers will be given a digital object identifier (DOI) to enable authors to cite them, and to continually link them to retrieval systems, i.e. the DOI remains the same whether it appears on the pre-publication version or the final printed copy.

The online version of The Journal also gives authors the opportunity to include data that would be impossible or impractical in the printed version. We encourage inclusion of supplementary material such as videos, 3D structures and images. These enhancements to the electronic version of The Journal will enable us to retain our competitive position within the field as well as benefiting authors and readers.

So, having an attractive journal and excellent papers, we need to let the world know!

## Publicity and advertising

As our publishers, Cambridge University Press (CUP) are responsible for the promotion and marketing of The Journal. Working with the Board they are present at key meetings and at Journal symposia. For 2002 two symposia are planned, entitled 'Fetal programming: from gene to functional systems' and 'Normal and pathological excitation–contraction coupling in the heart'.

I have been with the Society for over 10 years and things have changed considerably during that time. In 1991 both The Journal of Physiology and Experimental Physiology were typeset by CUP. With advances in computer technology, we were able to produce both journals in-house by DTP in 1993–94, with considerable cost savings. This also allowed us to put the papers on to our website in 1996, and The Journal was among the first journals to do so. All papers are now available on the HighWire e–publishing system.

In this time of uncertainty for printed journals, it is essential that we maintain a high presence with the electronic version. We have to ensure that The Journal keeps ahead of new developments and that it becomes easily and widely accessible.

During my time with The Journal, I have worked with several chairmen, each with their own strategies and ideas. As Managing Editor, it will be my aim to build on this experience to maintain a strong presence for The Journal, and hence the Society, to help to ensure that The Journal maintains its status as one of the leading physiological journals. The implementation of the new database and new format of The Journal will be my first priority and in the longer term, there will be on-going publishing and business initiatives to assess and implement.

JILL BERRIMAN

Cambridge University Press is the printing and publishing house of the University of Cambridge, founded in 1584. It is an integral part of the University and is devoted constitutionally to printing and publishing for 'the acquisition, advancement, conservation, and dissemination of knowledge in all subjects'. As such, it is a charitable, not-for-profit organisation, free from tax worldwide. For centuries, the Press has extended research and teaching activities through its printing and publishing of a remarkable range of academic and educational books, journals and Bibles. Today the Press is one of the largest academic and educational publishers in the world, publishing nearly 2,500 books and over 150 journals a year, which are sold in some 200 countries.

The Journal of Physiology has been printed and published by CUP for most of its long history. At CUP staff with direct links to The Journal include: Sue Belo (Senior Marketing Controller), Gavin Swanson (Editorial Manager), Jill Davies (Marketing Controller), Rebecca Curtis (Assistant Marketing Controller) and Trevor Burling (Production/Design Manager). The staff of The Journal has its offices on the CUP site.

Ever wondered then why The Journal is sited as J. Physiol (Lond.) by retrieval systems? Because the press was once on Euston Road.

As well as maintaining journal (and hence Society) income through subscriptions, advertising can provide revenue. Again, working with CUP, we are having a concerted campaign to attract advertisers to The Journal, to explore how successful this could be. If you wade through 20 pages of adverts before you reach the contents page, you'll know we have been too successful!

George Brooks

Peter Ellaway

Michael Joyner

Chris McBain

Anant Parekh

Karin Sipido

Stefano Vicini

Working with the Society, The Journal is being more proactive in attracting publicity for papers published. Those that may be of interest to the general public are selected, and a press release is written and sent out to major media contacts. In addition, we are notifying journals that publish round-ups of interesting papers published elsewhere, e.g. Nature Reviews Neuroscience, of our content, along with linking to relevant electronic sites e.g. GastroHep. Obviously for this to succeed we need to work closely with the Society and authors. As described in the Summer edition of the magazine by Mary Forsling, interactivity with the media can be fun!

## Personalities

To achieve the Board's objective of being the best in its field means The Journal has to maintain its standards and produce a better and better product. The introduction of electronic pre-publication, supplementary material, format revisions and a new database, are all part of this strategy. The Board also must look and plan ahead, not just in the area of technology and infrastructure, but also financially i.e. developing business plans and strategies. For example, the Board will be discussing the sale of (electronic) single articles (will this threaten subscriptions?) and also submission or page charges, as author-led costs replace reader-led (subscriptions) costs in the publishing world. The Journal now has a Managing Editor, to help deliver the decisions made by the Board, and also to inform the Board in developing its strategies. Jill Berriman, formerly the Chief Production Editor for the Physiological Society, has become the Managing Editor of The Journal of Physiology.

The Journal continues to attract an international membership to its Board. Editors serve for 7 years, attending up to three Board meetings a year, and participating in email discussions. They also review on average 26 papers per year. It has five Distributing Editors to deal with the ever increasing number of submissions to The Journal (up by over 200 last year): Michael Barish (Duarte, California), Prem Kumar (Birmingham), Yoshihisa Kurachi (Osaka, Japan), Michael Rennie (Dundee) and Stewart Sage (Cambridge), together with Richard Moss (Madison, Wisconson) are responsible for Topical Reviews.

2001 sees the retirement from the Editorial Board of The Journal of Physiology of Jerome Dempsey, Richard Dyball, Alasdair Gibb, Hartmut Kirchheim, Lutz Pott, John Rothwell, Kenton Sanders and Trevor Smart. The Board is extremely grateful to all of them for the enormous contribution they have made to The Journal as Editors; and in particular Alasdair Gibb who has acted as a Senior Distributing Editor and has been responsible for the introduction of Topical Reviews and Perspectives to The Journal, and Lutz Pott who served as a Distributing Editor. In addition, it is appropriate to single-out Richard Dyball, who has served two sessions as an Editor and undertaken the role of Press Secretary, Chairman, Distributing Editor and Ethical Editor, for special thanks.

The Board will be joined by 11 new Editors this year – George A Brooks (Berkeley, CA, USA), Eberhard H Buhl (Leeds, UK), Peter Ellaway (London, UK), Dirk Feldmeyer (Heidelberg, Germany), G David S Hirst (Melbourne, Australia), Michael J Joyner (Rochester, MN, USA), Chris J McBain (Bethesda, MD, USA), Anant B Parekh (Oxford, UK), Pontus B Persson (Berlin, Germany), Karin Sipido (Leuven, Belgium) and Stefano Vicini (Washington, DC, USA). Barry Hirst continues as Chairman.

**Susan Wray**
*Secretary to the Board*


## "I have to do what?"

What is the most frequent complaint you hear from people in science? Well, apart from how we feel undervalued, underpaid, and underfunded. I would hazard a guess that it might be about how many completely irrelevant things we have to do as part of our job. Things we never trained for, and never foresaw, and whose only purpose seems to be to waste our time and make us cross.

A couple of examples from my own recent experience. Within the last month, my employer has required me to do the following:

**1** Spend four hours attending a training course on "Equal Opportunities and Diversity Issues". This was compulsory, because, in the place where I work, ANYONE who might ever have to interview anybody for any job HAS to go on the Equal Opportunities course. So, a course on how to interview? Unfortunately not. (That might actually have been useful). Instead, the first thing we were told after arriving and being issued with our course folders was that the course "did NOT cover interviewing" (PS You will not be surprised to hear that there is a SEPARATE course for that, which takes a whacking THREE full mornings). This understandably left us wondering why we were there. The reason, apparently, is that my employer is worried that a disappointed job candidate will sue us, claiming discrimination, and win because we can't tell the Employment Tribunal that all our staff have been on an Equal Opportunities course. So there.

**2** Spend an hour reading and signing more than three dozen Safety Assessments. Now, people who work in labs can live with safety assessments for experimental procedures, especially procedures that could be dangerous. But Safety Assessments these days cover more much than what you do in the lab. Ours also cover such hazardous scientific procedures as "Working on Ladders", "Working above the Ground" (?), "Operating a Dishwasher" and, a personal favourite, "Climbing the Stairs". And these are detailed documents. Our "Working on Ladders" Assessment lists an impressive FOURTEEN separate safety issues to be considered, including choice of footwear (open toed sandals are a no-no, bad news for male physiologists over 40).

And I haven't even mentioned Quality Audit, Investors in People, GLP, TQA… the list goes on.

Now, I can't believe my experience is unique, so I want to issue a challenge to you, the readers:

**Please WRITE IN with YOUR example of the most utterly fatuous thing you have been required to do recently as (notionally) part of your job!**

Think of this as sort of a competition, like in glossy magazines. And cathartic into the bargain. Entries to me care of *Physiology News*, or by email to mark_cain50@hotmail.com. What is it they say? "The best examples will be printed here". How cool is that? Oh, and we might also rustle up a *Journal of Physiology* pen for you.

I think I've got at least one spare.

Happy grumbling

**Mark Cain**

# The old, the mad and the addicted

When I elected to go to an evening seminar on ageing, addiction and the unbalanced mind several people in the office looked at me askance. Had I some poorly relative lurking in the wings, or was I indeed worrying about my own advancing years and not inconsiderable alcohol intake. My pleas that it would be interesting to see how the 'new look' Royal Institution was doing, as well as being able to report on an area which must touch us all at some point went largely unheeded.

Under Baroness Susan Greenfield's new directorship the RI is obviously doing something right. The Michael Faraday Lecture Theatre was nearly full, and the mix of the audience demonstrated some pretty extensive and inclusive marketing. It was a filthy evening, but several people I talked to had travelled a considerable distance, left work early or left spouses/children to fend for themselves in order to attend. There was an air of general excitement.

Professor Stephen Rose took the Chair, explaining the format of the evening. There were three speakers lined up to give a short introduction to their subject areas, after which there would then be extensive time for questions.

We started with ageing, with Professor Lawrence Whalley, a psychiatrist from the University of Aberdeen, providing us with some facts and discussion, not all of which was cheering. Although there were some positive signs for men – such as the halving of the percentage of sufferers of disabilities aged 80 or above – the outlook for women wasn't so promising. He quoted studies showing that spatial ability, abstract reasoning and dual tasking all decreased rapidly, particularly in the fairer sex. Rather than the 'use it or lose it' school, he was very much more in favour of studies showing the effect of diet and genes. The good news as far as I could see was that he advocated the view that you didn't have to worry too much about diet and lifestyle before the age of about 50. He presented studies showing that even fairly high alcohol intake in adults below that age had little effect in later life. Phew.

Following on from Prof Whalley, Professor Kieran Regan, a pharmacologist from University College, Dublin, took the floor to discuss addiction. He began by extolling the virtues of drugs, expounding on their historical and social importance. Far from shying from the harder substances, he spent more time talking about heroin and cocaine than alcohol and nicotine, as I was expecting. He discussed the natural production of benzodiazipines (such as valium) by plants and microbes, and suggested that there might be a fitness advantage in the relief from anxiety produced by these drugs. He suggested a role in the evolution of Society, with those involved in agriculture having more natural exposure to these drugs. A similar fitness advantage was suggested for the over-confidence produced by cocaine. He pointed out to the, by this time slightly surprised, audience the use of drugs by some animals, and finished by saying that addiction had a far wider role than simply affecting the brain. It struck me rather forcefully that this was not an introduction to addiction, rather the societal and evolutionary role of drugs, but it was nonetheless interesting and the audience lapped it up.

Finally, Professor Julian Leff gave a psychiatrist's view of the unbalanced mind. He talked mainly about depression, and the fate – as for ageing, seemed to be worse for women. Depression frequently follows clustered stressful events in a 3-month period. Uncritical partners were preventative against the illness – it was pointed out in questions that women who don't marry live longer, but taking that decision may not be so healthy for your mind as it is for your body. Material and cultural disadvantage, as well as abusive relationships were all risk factors for the disease, although absolute causality was almost impossible to determine. He showed data from his own research demonstrating the advantages of therapy over medication, and was quite positive about the responsiveness of the disease to treatment of either kind. We were left however with some sobering statistics about the rise of the disease, and the problems with its diagnosis and even in persuading those suffering to seek help.

After these short introductions, the speakers took questions from the floor for an admirable 40 minutes or so. The questions – like the audience – were very mixed, ranging from those who had very personal reasons for wishing to get their point across to scientists arguing about the validity of the data presented. Stephen Rose did an excellent job in the chair, and the speakers were without exception gracious and polite.

I admit I was then exceedingly pleased to repair to the bar, and have a restorative glass of wine or two as well as the opportunity to talk much more informally with the speakers. The Royal Institution can only be congratulated for its efforts. In a time when scientists are being harangued by the government to engage with the public, in proper dialogue rather than via the lecture, and forgetting that ill-conceived and condescending concept of the public understanding of science, it appears that the RI really is providing an opportunity for scientists to meet these aims. I look forward to seeing some of you take the stage in that lecture theatre, and continue the good work in improving the public image, perception and knowledge of science.

**Maggie Leggett**

# Annual Subscriptions 2002

Membership Subscriptions are due for payment on 1st January 2002. An invoice should be enclosed with this mailing, if it was not enclosed, or you have misplaced it, please contact Mr Jamie Gould (jgould@physoc.org) for a replacement copy. If you pay by Direct Debit then you need take no further action, however, if you pay by cheque or credit card then please return payment with the remittance advice enclosed.

## Rates for 2002

| | **With** The Journal of Physiology | **Without** The Journal of Physiology |
|---|---|---|
| **Ordinary Member** | | |
| British Isles Resident | £155 | £50 |
| Overseas Resident | £230 | £50 |
| **Retired or Junior Members** | | |
| British Isles Resident | £145 | £30 |
| Overseas Resident | £230 | £50 |

All Members receive Programmes for Scientific Meetings and Magazines.

### *Experimental Physiology*

Members of the Society may subscribe to *Experimental Physiology* at the subsidised rate of £56.

## How to Save Money on Your Subscription

By paying by **Direct Debit**, you can have an automatic discount of £5 on the above fees **and** you are saved the inconvenience of writing a cheque and posting it each year. If you do not already have a Direct Debit arrangement with us, and you have a UK bank account, email Mr Jamie Gould **at once** for the forms. We **must** receive your Direct Debit application form by **30th November** if we are to process it for this round of subscriptions.

## Don't Forget

After last year's AGM, it is now even easier to join as a Member, so please encourage your colleagues to join up now. We can only continue our work with your help.

For further details on how to join please contact Jamie Gould (jgould@physoc.org) or visit the website, where application forms can be obtained (http://www.physoc.org/Membership/).

# Science and Engineering Ambassadors Scheme (SEAS)

In July, The DTI and DfES organised a forum to look at the existing and future activities which involve linking those working in science, technology, engineering and mathematics with schools. Their remit is not to limit any activities that are already in place, rather to add coherence and structure and increase awareness of the resources available. This project suggests that the Government is taking seriously the idea that an improved relationship between scientists and schools is desirable.

Many of you already visit local schools as a matter of course, and I expect others would get involved if possible. Several UKLSC Societies were represented at the above forum, and this prompted agreement among members of the UKLSC Education Group to compile a database of scientists who are willing to go into schools. Some of the infrastructure is already in place; *The British Society for Immunology* has already surveyed their members to gauge interest in talking in schools, *The Society for General Microbiology* produces material helpful for those who have not spoken in schools before and I have canvassed teachers at our workshops to estimate interest. The database, once compiled, will be available on the website biology4all.com, which is managed by a member of the group and open only to teachers, school children and other biology educators. By providing details you would not commit yourself to anything specific, rather a readiness to give a talk in a school should one be requested at a convenient time and place. This project will form the UKLSC Education Group initiative for science year, and is nicely timed to coordinate with the government SEAS scheme. Of interest to Members who are thinking of taking part may be that accreditation or other means of reward for 'ambassadors' are under discussion by the DfES.

I hope this collaborative initiative will encourage more of you to volunteer to go into schools. Generally, people find it a rewarding experience – an outside speaker generates interest and the feedback from teachers and students alike tends to be very positive. If you are interested in this or other science year projects, please contact me or visit the website www.scienceyear.com.

**Maggie Leggett**

# The Physiological Society INTERCALATED BSc BURSARIES

The Society has agreed to make an allocation (£24,000 for 2001 / 2002) for the support of medical, dental and veterinary students who wish to intercalate a BSc containing a strong element of physiology and including an experimental physiology research project.

## Eligibility

British medical, dental and veterinary students studying in the British Isles, intercalating a BSc within the UK who have no government, LEA or other external support for the intercalated year(s).

## Awards

Up to £2,000.

## Applications

The deadline is November 30th. Applications should be submitted by the Head of Department of Physiology (or equivalent) in the intercalating host department, following an internal selection process by a properly constituted committee to ensure lack of bias. No more than two applications may be submitted from an institution.

## Evaluation

Completed applications will be circulated to all members of The Physiological Society's Grants Sub-Committee, whose scoring will determine funding. When an institution submits more than one application, the Head of Physiology (or equivalent) will be asked to rank those applicants, although that information will count only as a reference point and will not be binding on the Sub-Committee. Assessment will take into account academic ability, research potential, and financial need, and the details of the research project proposed.

Application form on pages 39/40 or available from

The Administrator (BSc Bursaries)
The Physiological Society, PO Box 11319,
London WC1E 7JF or may be downloaded from the web.

Tel (020) 7631 1459
Email: jgould@physiology.demon.co.uk
Web site: http://www.physoc.org

# The Physiological Society MSc BURSARIES

The Society has agreed to make an annual allocation (£10,000 for 2001) for the support of graduates who wish to enrol in MSc courses in Physiology (including Human and Applied Physiology, Neurophysiology etc), or graduates in Physiology wishing to take courses relevant to the development of their careers in physiological sciences, and who are unable to obtain any other support for fees, subsistence etc. Grants will generally not exceed £1,000 and this support should be viewed as "seed funding".

## Eligibility

Science graduates of UK institutions, especially those wishing to enter Physiology as a new discipline, who are accepted for entry into courses leading to the award of the degree of MSc.

## Awards

The maximum allowable will generally be £1,000 and not more than a single award can be made to an individual.

## Applications

Applications can be made twice a year (deadlines 31 May for students accepted on but not yet started their course, 30 November for students at the beginning of their course). Applicants must complete an application form, available from The Physiological Society's Administration Office, together with a letter of recommendation from the Head of the department in which they graduated, *and* a letter of acceptance from the course director or Head of the department in which they seek to study. The application will contain a question relating to the candidate's career objectives.

## Evaluation

Completed applications will be circulated to all members of the Grants Sub-Committee, whose scoring will determine funding. Where more than one candidate is an applicant for the same course, the course organiser will also be asked to rank those applicants, although that information will count only as a reference point and will not be binding on the Sub-Committee. Assessment will take into account academic ability and financial need.

Application form on pages 41/42 or available from

The Administrator (MSc Bursaries)
The Physiological Society, PO Box 11319, LondonWC1E 7JF
or may be downloaded from the web.

Tel (020) 7631 1459
Fax (020) 7631 1462
Email jrelf@physoc.org
Website http://www.physoc.org/


Post Grad!
Hello Sir!
Bloop!
Well Henry, another new set up. I just hope it's going to work a bit better this time...
Oh cripes!
click!
BOOM!
Erk!
Oh, sorry Sir! But don't worry personally I think it takes years off you.....!
Neez!

# Pull up a chair and find out:

### 1 Do you have any of the following (tick all those which apply):

a) Personal secretary to type your letters

b) Ultrathin Pentium III notebook computer

c) Palm VX or similar handheld PC

d) Triband mobile phone so it will work in the USA

e) Frequent Flyer Club membership card

f) Ikea office furniture

g) Seven-series BMW

h) More than one striped shirt

### 2 When do you get up in the morning:

a) Wake at 4 am slumped over notebook computer/desk in study at home having dozed off at midnight while writing invited review.

b) Wake at 5 am to get in two hours writing of invited review before leaving for work at 7.

c) Wake at 8 am but don't get up until 10 due to spending two hours pondering whether it's worth it.

d) Wake at 10 am with crushing hangover.

### 3 When and where do YOU have breakfast:

a) At 6 am on inbound flight returning from international conference.

b) At 7 am in breakfast power meeting with other Professors.

c) At 7 am having coffee and "donuts" overloooking the Pacific with US colleagues.

d) At 11 am in local greasy spoon cafe fighting off crushing hangover (see 2d).

### 4 Complete the phrase: "A successful meeting is.."

a) ...one where everyone agrees with what I tell them.

b) ...one where a general consensus emerges.

c) ...one where the issues get a thorough airing

d) ...one where I don't wake up until 5 minutes before the end

e) ...one which lasts less than an hour

f) ...any meeting I managed to get out of going to.

g) ...a contradiction in terms

### 5 Which of the following would you be most likely to read on holiday?

a) *Nature/Science/Cell*

b) The Good Manager's Guide to Getting More out of Each Day

c) The latest Jeffrey Archer

d) The Self-Help Guide to Coping with Depression

### 6 You are invited to present your work at a conference in Japan. Do you:

a) Tell your secretary to book you a business class seat

b) Tell your secretary to book you on your usual airline so you can get your Frequent Flyer points

c) Ring Trailfinders and ask about special discount fares on Aeroflot

### 7 You realise you will be away when you are due to give a couple of lectures and have to persuade a colleague to give them instead. To clinch the argument you tell them:

a) It'll be good for your career

b) I'll owe you one

c) I'll have your children

# ARE *YOU* A PROFESSOR?

**8 Vocabulary test.**
**Tick any of the following words or phrases which you used seriously in the last two months.**

a) SWOT Analysis
b) line management
c) moving forward
d) top-slice
e) ring-fence
f) map onto
g) down-sizing
h) brainstorming
i) brilliant
j) add value
k) audit trail
l) hot-desking

**9 Professor-style catch phrase test.**
**Tick any of the following phrases which you have used recently:**

a) Let's flag up some options
b) This is a tremendous opportunity
c) We'd like you to run with the ball on this one
d) Every threat is another opportunity
e) It's time you added some administration to your CV.

**10 How many people work in your lab?**

a) Five post-docs and four PhD students
b) Can't remember exactly – haven't been in there for a while
c) One post-doc and a PhD student
d) Me if I ever get the time
e) Lab?

**11 What do you think about research staff getting office/desk space:**

a) If they've got time to sit down they're not working hard enough.
b) Office?! When I was their age I shared a cupboard with six people.
c) Desk? Surely you mean a multi-tasking office work-station? And anyway they should all be hot-desking.
d) Everyone needs their own piece of wood to bang their head on.

**12 Which of the following phrases best sums up your feelings about the last time your Department was re-organised?**

a) An exciting new development
b) Here we go again
c) Remember the one about the Emperor's new clothes?

**13 Have you ever appeared on television or in a national newspaper?**

a) Yes, when I was on *Horizon*.
b) Yes, when they panned the camera over the stands at the England Game/Test Match/Embassy World Snooker Championships.
c) Yes, but with my voice and face disguised when they did a programme about stress in academia.
d) No, but I have an autographed photo of Susan Greenfield.

**To see how you scored...**
**See page 44**

# Environmental Physiology of Animals

## Pat Willmer, Graham Stone & Ian Johnston

**Blackwell Science, Oxford. ISBN 0-632-03517-X. 2000, £27.50 paperback.**

As the title suggests, this book aims to take the basic tenet of Animal Physiology textbooks (that there is an amazing diversity of form and function) and place it in an environmental context (in the real world there are varying costs and benefits associated with conformity or regulation). The companion volume (Physiological Diversity and its Ecological Implications by Spicer & Gaston, reviewed in Magazine number 40) gave an enticing overview of physiological ecology, emphasising the adjustments in adaptation according to life history stages, while the present volume offers a more detailed examination of responses to the challenge presented by variations in the external environment, concentrating on aspects that limit exploitation of particular ecological niches. The book is helpfully split into three sections, developing the subject so that readers at different levels of understanding can join in the fun. It uses simplified diagrams to aid the flow and boxed comments to elaborate important and/or difficult issues. A comprehensive list of references serves as a useful introduction to the primary literature and, most importantly for a book meant to be dipped into, there is a comprehensive index running to 33 pages.

Section A deals with the necessary basics, reminding the physiologist that adaptation occurs by selection on phenotypes within the context of their fitness, and the ecologist that proteins underlie all cellular processes and their biochemical regulation is fundamental to any control being exerted. Given the poor grounding many students have in mathematical principles, the discussion on use of logarithms and exponents in examining scale is most helpful. Section B provides a useful introduction for the non-physiologist, with the relaxed style presenting traditionally difficult concepts in a less threatening manner than most texts. Although those familiar with the subject will find minor niggles with unsubstantiated value judgments it is still worth looking through (those who think lactate is the only end product of glycolysis are in for a surprise), and the full page summaries of key metabolic processes forms a handy reference. Where this wins out over other offerings is the extensive cross-phyla collation of data, giving the reader a better appreciation of both the differences and similarities among species. Given a common physiological challenge there is usually a range of solutions, and where there is not, gives a clue to the essential limits to life as we know it. This is particularly well illustrated in the chapters on respiration and effects of temperature, using information from enzymes to ecology.

Section C deals with the main message, the adaptive strategies that organisms use to cope with their environment, which inevitably contains some overlap with the previous sections. A broad sketch of the various habitats puts the discussion of physiological control in the context of an ecological niche. Thus marine life is discussed against a background of physical oceanography (did you know that seas occupy ~70% of the earth's surface and >99.9% of habitable space?), though the interface of shorelines and estuaries, to limnology describing rivers and lakes (and that <0.1% of the world's freshwater is available for habitation?). The problems of osmo- and ionoregulation in aquatic animals, sometimes in conjunction with high pressure or temperature, serve as a useful primer for the control of water and salt balance essential for terrestrial life which has attracted a literature out of proportion to it's biomass and diversity. Again, the more extensive use of examples from invertebrates and 'lower' vertebrates enables a number of principles to be emphasised with a clarity not otherwise possible. Some of the parallels drawn will raise a few eyebrows, e.g. the effects of hormones on reproductive behaviour and physiology in birds vs. humans. The familiar anthropogenic influences on climate are treated to a sobering discussion on its likely physiological impact. Adaptations to extremes of life on land goes beyond the usual discussion of deserts (I finally realised why most photos of gazelle are unflattering: they point their rump towards the sun as part of thermoregulation), while the widespread phenomenon of commensalism involves much more than parasites.

This is a book that brings the subject up to date in a manner suitable for undergraduates, but contains enough material to act as an introduction for those concerned with the broad concept of interaction with the environment. Readers should be impressed by the diversity and mechanistic beauty of answers to basic problems adopted by different animal species.

**Stuart Egginton**
*Department of Physiology*
*University of Birmingham Medical School*

# The Physiological Society
# APPLICATION FOR INTERCALATED BSc BURSARY

(PLEASE TYPE)

## Applicant's details

Name Date of Birth

Address

Postcode

Tel Fax Email

## Desired Course of Study

Institution where intercalated course will take place (name and address)

Details of physiology element in course (must include experimental physiology project).
*Please attach a one page summary of the experimental project, with title and supervisor*

Funding bodies to whom application for fees, subsistence etc have already been made

Please supply additional information or comments concerning your efforts to obtain funding from another source (use continuation sheet if necessary)

## Career Objectives

Reasons for wishing to intercalate a BSc, including any relevant background, accomplishments to date and career objectives (use continuation sheet if insufficient space)

## Previous Studies and Relevant Work Experience

A Levels/Highers Subject Year Grade

University Degree Subject Class Awarded

Institution

Details of any special projects/outstanding achievements

Other relevant work or study prior to present course

## Confidential Letters of Support

Please give details of two referees who have agreed to write in support of your application. These willnormally be the course director or head of the department in which you seek to study and the head of the department in which you graduated. Please ensure that their letters are sent before the relevant closing date.

**1** Name Position

Address

Tel

**2** Name Position

Address

Tel

If you are awarded a grant, we would like to transfer the funds directly into your bank/building society account. Please complete. (All information is confidential)

Bank/Building Society Account Number

Name of account holder Sort Code

On completion, the first referee should return SIX COPIES of this form and of supporting documentation to The Administrator (MSc Bursaries), The Physiological Society, PO Box 11319, LONDON WC1E 7JF.

**Closing date November 30th.**

# The Physiological Society
# APPLICATION FOR MSc BURSARY

(PLEASE TYPE)

## Applicant's details

Name Date of Birth

Address

Postcode

Tel Fax Email

## Desired Course of Study

Degree (*please give details*)

Title of course or proposed nature of study

Institution (department, institution name and address)

Funding bodies to whom application for fees, subsistence etc have already been made

Please supply additional information or comments concerning your efforts to obtain funding from another source (use continuation sheet if necessary)

Amount applied for

## Career Objectives

Reasons for wishing to undertake this course of study, including any relevant background, accomplish-ments to date and career objectives (use continuation sheet if insufficient space)

## Previous Studies and Relevant Work Experience

A Levels/Highers Subject Year Grade

University Degree Subject

Institution

Course subjects/grades

Year 1

Year 2

Year 3

Details of any special projects/outstanding achievements

Other relevant work or study prior to present course

## Confidential Letters of Support

The application must be accompanied by letters in support from two referees. These will normally be the Head of Department or Dean of the Institution in which you wish to take an Intercalated BSc, and an academic tutor who knows your work and personal circumstances, including financial.

**1** Name Position

Address

Tel

**2** Name Position

Address

Tel

If you are awarded a grant, we would like to transfer the funds directly into your bank/building society account. Please complete. (All information is confidential)

Bank/Building Society Account Number

Name of account holder Sort Code

On completion, the first referee should return SIX COPIES of this form and of supporting documentation to The Administrator (BSc Bursaries), The Physiological Society, PO Box 11319, LONDON WC1E 7JF.

**Closing date November 30th.**

## The Physiological Society

# MOLECULAR TECHNIQUES WORKSHOP

April 2002

A 2 week workshop for the training of physiologists in molecular biological techniques is to be run at the Institute of Biomedical and Life Sciences at the University of Cork, Ireland from 8th April to the 18th April 2002. The workshop, which is organised under the auspices of the Physiological Society and the Wellcome Trust, will be based on practical experimental procedures (including the handling of DNA and RNA, sub-cloning, restriction enzyme digests, the use of antisense technology, RT-PCR, and site-directed mutagenesis) and will be appropriate for physiologists who are reading for a PhD or are at the postdoctoral level with little or no prior experience of molecular techniques. The number of students on the course will be limited to 16. Students should intend to follow a career in the physiological sciences.

Applications for a place on the course will be treated competitively and should include the following information:

- A hard (paper) copy of your curriculum vitae including your name, address, daytime telephone number, age, nationality and educational background (particularly any experience of molecular biological techniques).
- The nature of your current work (PhD/post-doctoral project).
- A brief account (fewer than 500 words) of how attendance at the workshop would benefit your current project and your subsequent career.
- A letter of recommendation from a Society member to whom you are known.

Preliminary enquiries should be made to the Chairman of the Executive Committee's office at
The Physiological Society,
PO Box 11319, London WC1E 7JF
Email: sgreaves@physoc.org.
The closing date is Friday 21 Dec 2001.

Current protocols and details of previous courses can be found at:
www.ucc.ie/cpru

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Further details concerning the course itself and possibilities for assistance towards subsistence will be sent to successful candidates.
A charge of 400 euros will be made to cover the cost of accommodation, although a limited number of bursaries will be made available.

# Noticeboard

No notice is carried for more than three successive editions. Notices are starred so that readers can see at a glance whether this is the first (one star) or final (three stars) appearance of the notice. Notices for the Spring 2002 edition should reach the **Administration Office by 4 January 2002**.

## ELECTRONIC SUBMISSION TO THE JOURNAL OF PHYSIOLOGY

The Journal of Physiology now accepts manuscripts submitted electronically via the World Wide Web. The submission form, together with author instructions, can be accessed from: http://www.jphysiol.org

Please note that while members are welcome to advertise relevant events in the Magazine and on the website, advertisements via email will be restricted to events sponsored by the Society.

## TECHNIQUES WORKSHOPS 2001

Prospective bids to host workshops for 2002 should in the first instance be forwarded to Maggie Leggett at mleggett@physoc.org.

**Confirmed workshops include:**

**King's College London, Guy's Campus**
Workshop on the application of real-time PCR and mammalian cell signalling, 7 November 2001.

***Organiser:*** Professor David Sugden

**University of Glasgow**
Workshop on Fluorescence Imaging Using Confocal Microscopy, 22-23 November 2001

***Organiser:*** Professor Godfrey Smith

## YOUNG PHYSIOLOGIST'S SYMPOSIA 2001

Prospective bids to host symposia for 2002 should in the first instance be forwarded to Maggie Leggett at mleggett@physoc.org.

## LIFE SCIENCE CAREERS CONFERENCES 2001

These conferences are suitable for postgraduates and undergraduates, and are the only conferences aimed at life science students. They will be held at:

**University of Bristol**
3 November 2001
**University of Newcastle**
17 November 2001
**University of Westminster, London**
1 December 2001

These conferences are supported by The Physiological Society in conjunction with other UKLSC Societies. For more information, please see the website www.lifesci.org.

The Norwegian Biochemical Society will be hosting the 7th IUBMB Conference

## RECEPTOR-LIGAND INTERACTIONS

### Molecular, Physiological and Pharmacological Aspects in Grieghallen, Bergen, Norway May 4-8, 2002

More information can be obtained from: http://www.biokjemisk.com/kongress2002/**

## UNIVERSITY OF CENTRAL LANCASHIRE MEETING OF THE PHYSIOLOGICAL SOCIETY

### 9-10 May 2002

There will be a strong bias to comparative physiology with both the comparative and invertebrate neurosciences, and the comparative physiology Special Interest Group participating. In addition, there is likely to be a symposium on comparative respiratory physiology. Additional information will be available from http://www.physoc.org/Meetings/future.html**

## SO – *ARE* YOU A PROFESSOR?

### Scores for quiz:

**1** 1 mark for each
**2** a) 3 b) 2 c) 0 d) –1
**3** a) 3 b) 2 c) 1 d) 0
**4** a) 3 b) 2 c) 1 d) 0 e) 0 f) 0 g) –1
**5** a) 3 b) 2 c) 1 d) 0
**6** a) 2 b) 1 c) 0
**7** a) 2 b) 1 c) 0
**8** 1 mark for each
**9** 1 mark for each
**10** a) 3 b) 2 c) 0 d) 0 e) –1
**11** a) 2 b) 2 c) 2 d) 0
**12** a) 2 b) 0 c) –1
**13** a) 2 b) 0 c) 0 d) 0

### What your score means

**Negative score OR 0-5** You are clearly a bit of a troublemaker. If not you might be well advised to seek treatment for depression. Whatever your particular problem, you are obviously not Professorial material and might be best advised to start investigating careers outside Science.

**5-15** Although you probably pass for a normal member of Society you are not doing enough to MAXIMISE YOUR POTENTIAL. Perhaps you lack ambition? Try wearing a striped shirt and/or practise giving orders in the mirror.

**15-30** You clearly have a future in Professordom. Perhaps you still lack that little something extra required to make it to the very top. Try and sprinkle your conversation with the words and phrases listed in questions 8 and 9 above, wear a suit at work more often, and cultivate a look of purposefulness.

**30-40** You are a Professor. If not, apply for promotion immediately.

**More than 40** You are a highly unusual individual, since you possess enough Professorial character traits for at least two – and possibly more – Professors. When you explain your predicament to the understanding people in the white coats you might find it helpful to use the phrase "Napoleon Complex'.