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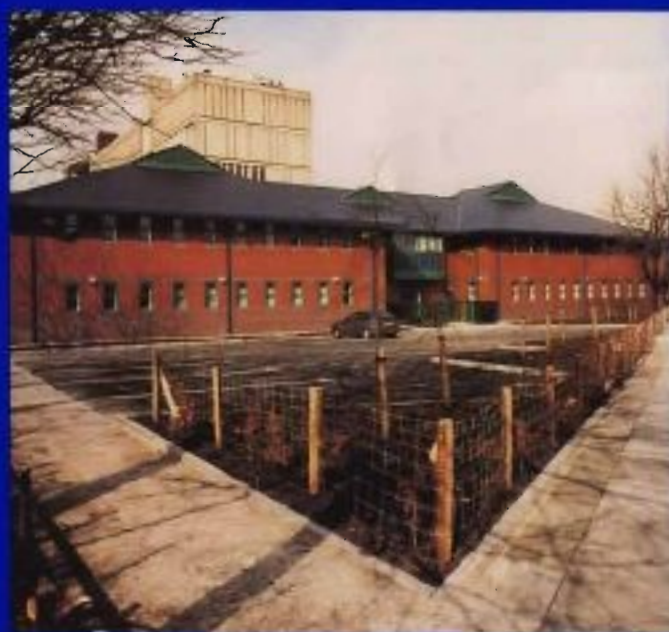
*Physiological*

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*Society*

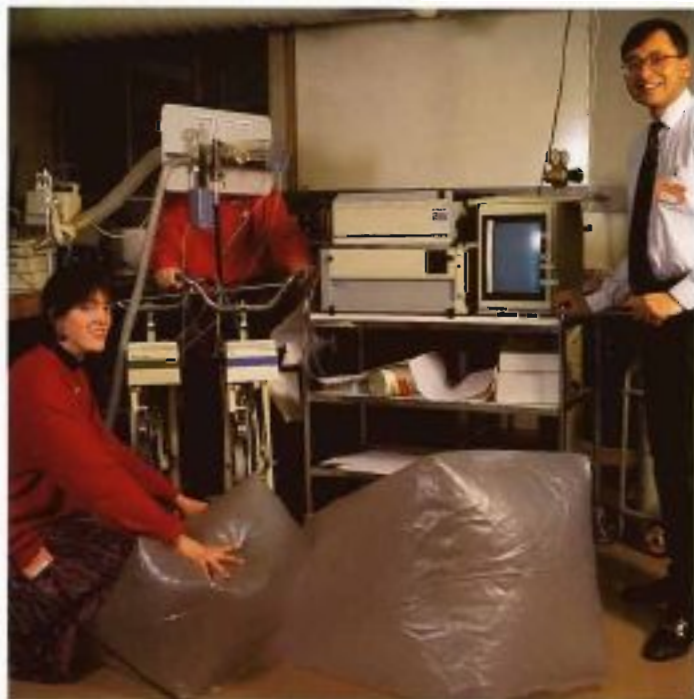
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*Magazine*



**April 1994**

**No 13**



Annabel Nickol and Ajavit Datta demonstrating their new technique for studying dynamic chemoreceptiveness in man (Dr John Seery, the obscured bicyclist), breath by breath. This apparatus was destined for subsequent experimental use on the British Everest Expedition.



Stella Rowlands with her exhibition showing the activities of her Human and Applied Physiology MSc students.

**DEMONSTRATIONS  
AT THE KING'S COLLEGE  
MEETING  
DECEMBER 1993**

Photography by Ander McIntyre



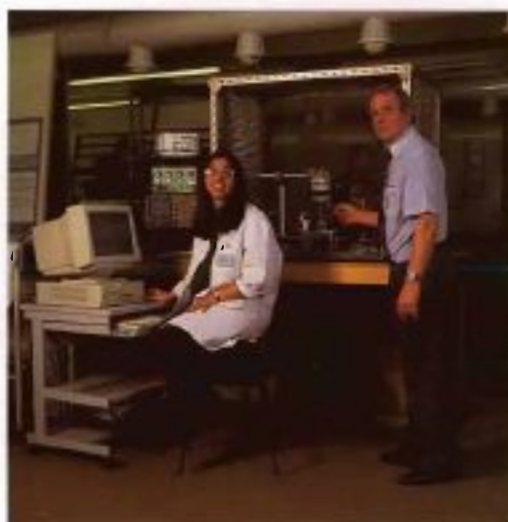
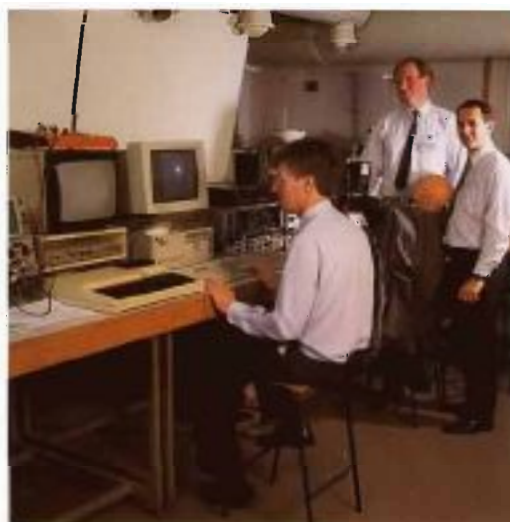
Open ...

Closed ...



What was the Mystery Object in Demonstration D22? Turn to page 10 to find out.  
Photograph courtesy of the Science Museum

Chris Louca, Sam Cadden and Roger Linden with their inanimate friend, who is demonstrating the role of periodontal ligament chemoreceptors in jaw reflexes in man.



Subhra Chowdhury and David Layman with their computerised method for monitoring  $K^+$  permeability of the nerve perineurium.

<b>Editor's Letter</b> - <i>Saffron Whitehead</i> .....	1
<b>Physiology at Liverpool</b> - <i>David Eisner &amp; Ole Petersen</i> .....	2
<b>Committee News</b>	
New Honorary Member - <i>Susan Wray</i> .....	4
Annual General Meeting .....	4
<i>Experimental Physiology</i> .....	4
Workshops .....	5
Prizes & Prize Lectures .....	5
<b>Special Interest Group Forum</b>	
Epithelia & Membrane Transport - <i>Barry Hirst</i> .....	6
Microvascular & Endothelial Physiology - <i>Giovanni Mann</i> .....	6
Neuroendocrinology - <i>Mary Forsling</i> .....	7
Blood Brain Barrier - <i>John Greenwood</i> .....	7
Comparative & Invertebrate Neuroscience - <i>Cathy McCrohan</i> .....	7
Higher Sensory Functions - <i>Andrew King</i> .....	7
Muscle Contraction - <i>K W Ranutunga</i> .....	8
<b>Letters</b>	
No Hypothesis, No Data - <i>Ron Maughan</i> .....	9
More Women for the Society - <i>Lynn Bindman</i> .....	9
After-Dinner Sexism .....	9
A Standing Ovation - <i>Evelyn Conrad</i> .....	9
<b>Traces of the Past</b>	
Sperm Monitor or Diving Bell? - <i>Tilli Tansey</i> .....	10
Sharpey-Schafer Republished - <i>Tilli Tansey</i> .....	10
<b>Science News &amp; Views</b>	
Suntan or a Peptide Tan? - <i>Tony Thody &amp; Gillian Hunt</i> .....	12
Peptides and Blood Flow under the Skin - <i>Sue Brain</i> .....	13
Exercise puts a Handle on Fat - <i>Adrianne Hardman</i> .....	13
<b>Teaching &amp; Technology</b>	
Images of Leaky Capillaries - <i>Paul Fraser</i> .....	15
TLTp: Problem-Based Practicals for Biomedical Students - <i>Malcolm George</i> .....	16
<b>Policies &amp; Politics</b>	
The Right to Hope - <i>Saffron Whitehead</i> .....	18
Legislation to Curb Animal Rights Activists - <i>Jack Botting</i> .....	18
SET 7: National Science Week - <i>Laurence Smaje</i> .....	19
<b>Young Physiologists</b>	
A Chilean Experience - <i>Karen Everett</i> .....	20
<b>News from Abroad</b>	
Eastern Physiological Societies: Indonesia & Thailand - <i>Adnyana Manuaba, Pranee Jaiarj</i> .....	23
<b>Noticeboard</b> .....	24
<b>Journal Contents</b> .....	26
<b>Affiliation Form</b> .....	33

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



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## Action Points

-  **Academic Fares** Members wishing to take advantage of the special terms offered by Northwest Airlines should note the special telephone numbers which must be used: (0293) 561000 for flights from London and (041) 226 4175 for flights from Glasgow.
-  **Affiliate Travel Grants** The next closing date for applications is 31 March.
-  **AGM: Committee nominations and agenda items** Nominations to be made on the proposal of five Members of the Society should reach the Committee Secretary by 20 May.
-  **Cambridge Meeting** Abstracts may be submitted between 5 and 14 April.
-  **Grants for Eastern European and Third World Physiologists** The next closing date for applications is 31 March.
-  **Wellcome Prize in Physiology** Nominations should reach the Committee Secretary by the end of April.

## Magazine Editorial Group

Saffron Whitehead .....	Chairman
Phil Harrison .....	Science News & Views
Malcolm Segal .....	Teaching & Technology
Laurence Smaje .....	Policies & Politics
Tilli Tansey .....	Traces of the Past
Susan Wray .....	Young Physiologists

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Contributors to this issue of the Magazine, other than those whose current addresses are included in the Society's membership handbook known as the *Grey Book* (1993 ed), are as follows:

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## GUIDELINES FOR CONTRIBUTORS

These guidelines have been drawn up by the Editor both to assist authors in writing their contributions to the *Magazine* and to reduce the subsequent editing process. The *Magazine* Editorial Group is trying to ensure that all submissions are written in a journalistic style so that articles will have an immediate interest value for a wide readership and will be readable and comprehensible to non-experts.

### Format of articles

The main message or question posed by the article should be introduced within the first two or three sentences. The background for the topic should then be established leading up to the final denouement or conclusion of the article.

### 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 200 words to a maximum of 800 words.

### Submission of articles

The Editorial & Production Office encourages authors to submit text in the form of a disk accompanied by a printout. Use of disks reduces the risk of introduction of errors during re-typing. When disks are submitted, it is helpful to give brief details of the computer, operating system and software package(s) used (DOS formatted Wordperfect 5.1 files preferred, but not essential).

### Deadlines for submission

If in doubt, see Schedule of Meetings Publications Deadlines for 1994 or contact the Editorial & Production Office. 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 and white, prints or transparencies.

### Author photographs

The *Magazine* normally includes photographs of the authors of articles and authors are asked to submit photographs (colour or black and white; prints rather than transparencies if cropping is required) of themselves direct to the Editorial & Production Office.

### References

Authors are requested to keep the number of references to a minimum (preferably no more than two or three).

### Suggestions for articles

These should be made (in writing, by phone, or in person at Scientific Meetings) either to the Editor, to the Editorial Assistant or to the relevant member of the *Magazine* Editorial Group (see above).

## A VOTE OF THANKS, AN APPEAL TO READERS

The Society owes a great vote of thanks to Kwabena Appenteng. Together with the Oxford Editorial staff, he built up the *Magazine* from a four page typescript circular to a blue glossy and then to the three tone plus colour which it is today. But it is not only for the transformation of the format of the *Magazine* that he must be accredited. He was determined to produce a publication that would encompass all aspects of the Society from the level of the Committee down to young graduates, from physiologists in the UK to those abroad, from Nobel Prize winners to those starting in their careers, from politics to profiles, from the parties to the serious. He had new ideas, initiatives and seemingly endless energy in pursuing them.

Kwabena  
Appenteng  
Photograph by  
Ander McIntyre



I could say much more but it may sound more like an obituary of a faded physiologist rather than a big thank you on behalf of the Editorial Group and Committee. Kwabena is far from fading and is simply stepping down so that he can, to quote, "focus more on science". Already I can appreciate his sentiments because it is no easy task to produce this *Magazine*. Thus, I am appealing to all Members of the Society and beyond to send in ideas for the *Magazine*.

To help potential contributors, I have reformatted the contents so that you might identify a niche and an outlet for your suggestions. It has also meant that each member of the Magazine Editorial Group has a defined role and responsibility towards a particular section of the *Magazine*. Finally, with the help of the Editorial staff at the Oxford Office, we have drawn up some Guidelines for Contributors (*see facing page*).

Anyone with a scientific story or a controversial hypothesis is encouraged to contribute to **Science News & Views** (Phil Harrison). **Traces of the Past** (Tilli Tansey) is all about the historical aspects of Physiology whether it be technical, experimental, anecdotal or personal. A slot for **Teaching & Technology** (Malcolm Segal) is intended to cover the broad spectrum of teaching Physiology - from videos to practicals, from teaching objectives to reviews of

textbooks in physiology - and any interesting practical or innovative techniques for research and data analysis.

We're no ivory towers these days, so any up-front news for **Policies & Politics** (Laurence Smaje) will be warmly welcomed. They can span from Save British Science to the AUT, from research funding to government policies, from the Research Defence Society to the future of Physiology in universities. And with all this we need news and views for the **Young Physiologists** (Sue Wray). This section will also welcome advertisements for any posts available for young physiologists starting in their careers. Finally there will be **News from Abroad**. This will literally cover a broad spectrum but it will be good to have news of Physiology from far away parts of the globe.

One cannot have a magazine without **Letters**, thus comments, controversy or whatever will be warmly received (publication at the discretion of the Editorial Group). **Committee News** and profiles of **Departments** which are hosting current Meetings will continue, as will the **Special Interest Group Forum**. News of forthcoming events, meetings, exhibitions and anything else that may be of interest to Members and Affiliates will be published in the section called **Noticeboard**. From time to time there will be **Special Features** which encompass a series of short articles concerned with a particular theme. Any ideas for topical issues will be welcomed.

Following Kwabena's achievements, we want this *Magazine* to continue to reflect the Society in all its aspects. For this we need your help, suggestions and support to maintain its success into the future. We look forward to hearing from you.

In the meantime, a very special thank you to Kwabena and continuing thanks to Heather Dalitz and Jane Ault at the Oxford Editorial & Production Office.

Saffron Whitehead



Saffron  
Whitehead

## WELCOME TO OUR DEPARTMENTS



Since the Society last met in Liverpool in 1990, important developments have occurred. David Eisner's appointment to the Chair of Veterinary Biology in 1990 has strengthened physiological work in the Faculty of Veterinary Science and many research collaborations between the Department of Physiology in the Faculty of Medicine and the Department of Veterinary Preclinical Science have been established.

### New Physiology Research Building

From 1898 to 1992 the Department of Physiology was housed in the University's old Victoria Building Complex in laboratories designed and built when Sherrington was George Holt Professor of Physiology. In 1992 the new Physiology Research Building, funded by grants from the UFC (as it then was) and the Wellcome Trust, was formally opened by Bert Sakmann. Before unveiling a plaque in the foyer of the new building, he wished Ole Petersen and his colleagues all possible luck with the new habitat and expressed the sincere hope that they would continue with the tradition of innovative research - a hallmark of the Liverpool Physiological Laboratory. The 2000m<sup>2</sup> pure research building has functioned extremely well and a substantial body of work has already been accomplished.

*A pristine laboratory in the new building*



### New four-year PhD programme funded by the Wellcome Trust

Bob Burgoyne, Graham Dockray, David Eisner and Ole Petersen have been the prime movers in establishing a new four-year training programme leading to a PhD in Cellular and Molecular Physiology. Usually, PhD students have to select one supervisor and one project before they start. The Liverpool four-year programme allows students to gain a much

wider range of experience of experimental techniques by rotation between laboratories and to make a later and more informed choice of research project.

In the field of cellular and molecular physiology, the combined use of molecular biological, protein chemical, patch clamp electrophysiological and microscopical imaging techniques is becoming increasingly important. The students will therefore receive training in all these areas and many of the projects will hopefully involve combinations of these techniques so that several supervisors will be involved in each project. The funds for this four-year PhD training programme, which starts this year, will cover the tuition and laboratory fees as well as the maintenance costs (Wellcome Prize Studentships) for 30 postgraduate students starting over the next six years.

### The research groups

The main research strength in Liverpool is in the field of cellular and molecular physiology. The borders between the different groups working in this area are not sharp, since there are many collaborative efforts, but it may nevertheless be useful to describe the major individual groups.

Work in Bob Burgoyne's lab over the past ten years has been concerned with the mechanisms involved in secretion. It has focused on the characterisation of exocytosis leading to catecholamine release from adrenal chromaffin cells. Key aspects of this work have been the description of the calcium signals leading to exocytosis, demonstration of the importance of the cytoskeleton in the control of exocytosis, and identification and purification of soluble proteins that regulate calcium-mediated exocytosis. More recently, the secretory pathway leading to milk protein secretion in mammary epithelial cells and factors that regulate secretion from these cells have been characterised in detail. It had been believed that milk protein secretion occurred in a non-regulated constitutive fashion, but it turns out that secretion from mammary cells is under both positive and negative control. This group is also interested in the control of differentiation of cerebellar neurones by NMDA receptor activation. Other work in the neurobiological area is carried out by Richard Morris, who studies the physiology and pharmacology of spinal neurones.

The main thrust of work in the laboratories shared by Graham Dockray, Rod Dimaline and Andrea Varro, is the elucidation of physiological mechanisms controlling the synthesis of regulatory peptides and functionally related amines. They are presently directing their attention at two issues. Firstly, the mechanism controlling abundance of mRNA's encoding regulatory peptides and amine-synthesising enzymes in the stomach; secondly, the cellular mechanisms determining post-translational conversion of newly synthesised, inactive, peptide precursors to their active forms. The major findings over the last year include

- the demonstration that abundance of the mRNA encoding the enzyme producing histamine (i.e. histidine decarboxylase) is regulated over periods

as short as the time to digest a single meal - this is probably the main determinant of histamine production and, therefore, gastric acid secretory responses during digestion of a meal

- the steps leading to production of biologically active gastrin include phosphorylation of precursor peptides - the phosphorylation site is immediately adjacent to the region that determines biological activity, suggesting that prohormone phosphorylation regulates post-translational maturation

The relevant molecular control mechanisms are now being explored by cloning, sequencing and site directed mutagenesis. In addition the localisations of prohormone processing sites are being investigated in collaboration with Camille Vaillant.

The cardiac muscle research group is led by David Eisner and Stephen O'Neill. Over the last few years this group has studied excitation-contraction coupling in cardiac muscle. The earlier work investigated the key role of intracellular  $\text{Na}^+$  ions in regulating contraction. This was followed by much work measuring intracellular calcium. A particular interest is the process of calcium release from the sarcoplasmic reticulum. A variety of approaches, including the first use of photolabile "caged" calcium chelators in intact cardiac cells showed that this release occurs by the process of calcium-induced calcium release. More recent work is aimed at investigating the mechanisms by which cardiac contraction is graded and regulated.

Ole Petersen, David Gallacher and Alexei Tepikin direct a group working on ion channels and pumps in secretory cells with special emphasis on intracellular  $\text{Ca}^{2+}$  signal generation. The group has shown that repetitive cytosolic  $\text{Ca}^{2+}$  spikes evoked by submaximal agonist concentrations are associated with virtually synchronous pulses of  $\text{Ca}^{2+}$  extrusion mediated by the plasma membrane  $\text{Ca}^{2+}$  pump. More recently, it has been demonstrated that agonists and direct intracellular inositol trisphosphate application can evoke local or global cytosolic  $\text{Ca}^{2+}$  oscillations depending on dose and system sensitivity. The group has shown that in pancreatic acinar cells the secretory pole contains particularly sensitive  $\text{Ca}^{2+}$  release sites important for secretory control. State of the art imaging technologies are now in use to investigate further the spatial dynamics of intracellular messengers. Recently, there have been joint publications with the groups of Mike Berridge (Cambridge), David Eisner and Haruo Kasai (Tokyo).

Dr Susan Wray and her research group are investigating functional aspects of smooth muscle physiology. Currently, the mechanisms whereby intracellular and extracellular pH affect vascular tone are being studied. In particular, the mechanism underlying the rapid passage of protons across the vascular smooth muscle surface membrane, which they have recently reported, is being sought. Another project is comparing the effects of pH alteration on coronary and cardiac myocytes. Both rat and human myometrium are being studied to elucidate the cellular changes which occur with hypoxia. This might be involved in cases of uterine dysfunction during

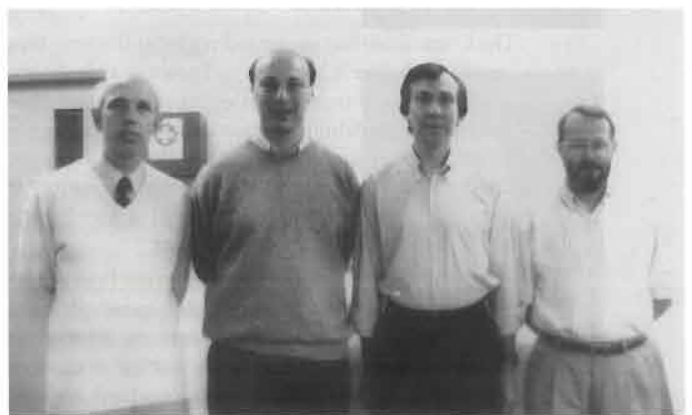
childbirth. Simultaneous measurements of either intracellular  $[\text{Ca}^{2+}]$ , or pH and force are required to explore functional effects. Finally, since the results from *in vitro* studies indicated profound effects of pH and metabolite alteration on force in the myometrium, they are making *in vivo* recordings of force, pH and metabolites to determine if they are important determinants of uterine contractile activity in intact preparations. This involves using  $^{31}\text{P}$  NMR facilities at Manchester University.

### Connections with The Physiological Society

There is a long tradition of Liverpool physiologists serving The Physiological Society. Charles Sherrington was one of the first Secretaries. Herbert Roaf, who was George Holt Professor in the 1930s, became one of the Society's longest serving Secretaries (13 years). Rod Gregory found time to be Foreign Secretary for five years during his long and very productive period as Head of the Department of Physiology; and at this time Reginald Fitzpatrick (Professor of Veterinary Clinical Studies) was Treasurer. Today, Graham Dockray is Chairman of The Physiological Society Committee, David Eisner is one of *The Journal of Physiology's* Distributing Editors and Ole Petersen serves as Foreign Secretary.

We warmly welcome The Physiological Society back to Liverpool. It has become a tradition to have the University of Liverpool Sherrington Lecture scheduled during Scientific Meetings of the Society here in Liverpool. In 1984 Roger Guilleman gave this lecture and in 1990 Bert Sakmann delivered the Sherrington Lecture one year before his Nobel Prize. This time, Richard Tsien has been chosen. As an innovation at this Meeting, we have an ad hoc Designated Session on Signal Transduction Mechanisms and Oleg Krishtal will deliver a Designated Lecture. Sue Wray and David Eisner have organised a symposium on smooth and cardiac muscle and the Biophysical Society has an ion channel symposium immediately following our Meeting. We hope you enjoy the Meeting and the city.

David Eisner and Ole Petersen



Liverpool's four physiological professors: (left to right) Ole Petersen, David Eisner, Graham Dockray and Bob Burgoyne

## MEMBERSHIP

## New Honorary Member

Wilfred Faraday Widdas, BSc, PhD, DSC, MBBS, was elected an Honorary Member of the Society at the Semi-Annual General Meeting on Thursday 10 February 1994.

Professor Widdas' major contribution to Physiology has been in the field of transport mechanisms, for which he is internationally distinguished. His most important work was probably a quantitative analysis of *in vivo* placental glucose transfer showing the inability of diffusion to account for the transfer and the proposal of "carriers". This and subsequent work took the field of enzyme kinetics into transport processes. These contributions are widely recognised today.



Wilfred was born in 1916 the son of a mining engineer and a relation of Faraday (the latter is an inheritance which perhaps accounts for him always applying the rigours of maths and physics in his work). After obtaining a medical education at Durham and Newcastle, he undertook a career in Physiology at King's College London and was head of department at Bedford College London from 1960 until 1981, when he "retired". All those who have recently encountered him at meetings of the IUPS (see the

King's issue of the *Magazine*) or read his recent papers will know that "retired" does not describe the man! He published around 100 papers before retiring and over 30 since. He is currently working on the anion exchanger in erythrocytes.

I think in every conceivable way Wilfred Widdas deserves his election to Honorary Membership and that his courteous and knowledgeable contributions will continue to enrich the world of Physiology and the Society in particular.

Susan Wray

## A Plea to Members

The Committee has expressed regret at the time that can elapse before it hears the sad news of a Member's death. Members are asked to let either the Committee Secretary or the Administration Office know promptly when they learn that a colleague has died. In particular, the Committee often wishes to see that the Society is formally represented at the memorial service by one of its members or by a former Officer.

Members are also asked to remember the Benevolent Fund at such times. A death can cause practical problems for the surviving relatives, which are particularly hard to deal with during a time of emotional distress. For instance, a joint bank account may be frozen for a lengthy period, leaving a widow or widower without cash to meet the electricity bill. Or a partner might suddenly find that they need to return to work unexpectedly soon and need help with childcare during a re-training course. If you know of

anyone in difficult circumstances such as these, please contact the Trustees of the Fund (as listed in the *Grey Book*) or the Administration Office.

## ANNUAL GENERAL MEETING

Members who wish to raise items for discussion at the Annual General Meeting are asked to send these to the Committee Secretary, Richard Boyd, at the Administration Office in Oxford before 20 May.

## Nomination of New Committee Members

Members are reminded that candidates for election as Ordinary members of the Committee may be nominated on the proposal of at least five Members of the Society. Nominations must reach the Committee Secretary, Richard Boyd, at the Administration Office in Oxford by 20 May to be in time for inclusion on the ballot paper.



Current Committee Members. Left to right, back row: Nick Standen, Kwabena Appenteng, Richard Vaughan-Jones, David Miller, Chris Fry, John Widdicombe, Peter Ellaway, Richard Boyd, Jim Gillespie, Annette Dolphin; front row: Cecil Kidd, Roger Green, Saffron Whitehead, Ole Petersen, Abe Guz, Janice Marshall, Susan Wray, Joan Abbott, Noel McHale and Gareth Leng. Missing: Graham Dockray, Ian McGrath, Denis Noble, Laurence Smaje, Brian Whipp.

## EXPERIMENTAL PHYSIOLOGY

## Submission on Disk

*Experimental Physiology* is in the process of changing over to production by the desk-top publishing (DTP) system in the Society's Cambridge Press Office. Authors of **full length papers** will be asked to supply a disk of the **accepted** version of their manuscript, if at all possible. Instructions for preparing disks will be sent with the notice of acceptance. For **Rapid Communications** the initial submission should be on disk whenever possible. The instructions given in *Experimental Physiology* (1994), 79, ii will continue to apply until the end of this year.

## Coloured Illustrations

With the widespread use of computer-based colour imaging in several areas of physiology and reduction in costs of colour reproduction, editorial policy in respect of colour illustrations has been changed. The Editorial Board now encourages submission of such illustrations whenever they enhance the scientific value of the paper. The additional costs involved may under certain circumstances be borne by the journal. The final decision will, of course, remain with the Editorial Board.

## EDUCATION & INFORMATION SUB-COMMITTEE

### Workshops

Members were asked in 1989 what activities they would most like the Society to support if further funds became available. The suggestion receiving the largest vote was Workshops.

- ☒ Workshops on experimental techniques
- ☐ Research studentships
- ☐ Special Interest Groups/ Designated Sessions
- ☐ Travel funds
- ☐ Wider range of research symposia
- ☐ Departmental seminar programmes



The first Workshop sponsored by the Society was held in 1992, but no further suitable suggestions for sponsorship have been received.

The Sub-Committee is keen for further Workshops to be held and has now co-opted Clive Orchard in Leeds to act as the member of the Sub-Committee responsible for stimulating the organisation of Workshops. He would be very glad to hear from anyone who

- would like to organise a Workshop
- can identify a suitable topic for a Workshop

Anyone interested should contact either Clive or Chris Fry, Chairman of the Sub-Committee, as soon as possible.

## GRANTS IN SUPPORT OF PUBLIC UNDERSTANDING OF SCIENCE

Grants are available for new or continuing activities or initiatives directly concerned with the promotion of the public understanding of science. Innovative and imaginative proposals are welcome. Over 100 grants have already been awarded for an exciting range of projects, such as science in theatre, dance & art; enhancing displays; travelling shows & open days; providing equipment & interactive exhibits; signage, labelling & leaflets; science workshops; talks & lecture series.

Applicants must be UK residents. The maximum grant is £3,000 and allocations will often be less. Closing date: 31 March and 31 October each year: late applications will be considered at the next round. Application forms are available from Ms Cheryl Davies, The Royal Society, 6 Carlton House Terrace, London, SW1Y 5AG, tel (071) 839 5561 ext 247.



## PRIZES & PRIZE LECTURES

### Wellcome Prize in Physiology

The period for nominations for the 1994 Wellcome Prize has been extended to the end of April.

This Prize for young physiologists was instituted to encourage them and bring their work to general notice. It is awarded biennially and takes the form of a lecture, an award and a medal presented at the Annual General Meeting in the year of the award. The lectures are, subject to the agreement of the Editorial Board, published in *Experimental Physiology*.

Nominations for the Prize, which should propose young physiologist (less than 35 years of age) who is permanently resident in the UK or Eire and who is considered to have made an outstanding contribution to physiological science, can be made by Heads of Departments or by five Members of the Society. Such nominations should consist of a full list of publications by the nominee together with a short statement of why the candidate should be considered for the Prize and should be sent to the Committee Secretary.

In previous years, the Prize has been awarded to Kevan Martin, David Eisner, Andy King and Hugh Matthews.

### Pfizer Prizes

The first two Pfizer Prizes have now been awarded. Both went to final year PhD students for Communications presented as part of the Microvascular & Endothelial Designated Session at the King's College London Meeting in December. Eight Communications had been considered for the awards.

Lisa Madge, from the Vascular Biology Research Centre at King's College, was introduced by Giovanni Mann. She has been investigating altered signal transduction in human endothelial cells exposed to oxidative stress. Her findings provide direct evidence that physiological concentrations of  $H_2O_2$  stimulate NO release via constitutive NO synthase.

Elizabeth Stevens, from the Department of Pharmacology at Queen Mary & Westfield College, was introduced by DR Tomlinson. She has been trying to determine the extent to which endoneurial ischaemia derives from endothelial disturbance and contributes to neural dysfunction. Her Prize-winning Communication was on blood flow in nerve and dorsal root ganglia in experimental diabetes.



## EPITHELIA & MEMBRANE TRANSPORT

### Designated Session at King's College London

Joe Lamb started the Designated Session by describing a new hypothesis involving ouabain binding to intracellular sodium pumps. Prof Lamb indicated that the hypothesis had developed considerably since he wrote his precirculated abstract and, perhaps in an attempt to ensure that the Session started with some lively discussion, he expressed his wish to accommodate some substantial changes before its publication. There were a number of Communications demonstrating the current resurgence in interest in how cells adapt to changes in volume. Thus we heard about volume-activated  $K^+$  and  $Cl^-$  channels in a variety of cell types and the relation - or sometimes lack thereof - of volume-activated anion conductances to amino acid and drug efflux from a variety of cell types. The discussion after these Communications, in particular, was lively as befits a topical and perhaps contentious area of Physiology. In all, this Session attracted 37 oral and poster Communications.

For the discussion and approval of Posters (less than ideally timetabled on the day after the Poster session, due to the constraints of a very full programme), authors were again afforded the opportunity of giving a one minute summary of their Poster illustrated by a single slide. This makes a tedious part of the programme rather more accessible to the rest of the audience. Clive Ellory, travelling especially in from Oxford for this session, pointed out that, although the red blood cell was the most interesting and relevant for studies of membrane transport, it had its drawbacks. Lacking a nucleus, the red blood cell was not the ideal cell for studies of regulation of membrane transporters. In the age of molecular biology, even he had been forced to look from the model cell to one more suited to studies of gene regulation.

Those present at the Designated Lecture were treated to a superb exposition on the regulation of intracellular pH during activation of neutrophils by Sergio Grinstein from Toronto. Although somewhat jetlagged (he had flown into London that same morning), his lecture in no manner reflected any signs of tiredness or slowness of thought. Dr Grinstein prefaced his lecture by emphasising the enormous concentrations of  $H^+$  generated intracellularly during oxygen radical generation in the neutrophil. These intracellular protons are dispersed, not only by  $Na^+/H^+$  exchanged and  $H^+$ -ATPase activities in the neutrophil, but through  $H^+$  channels. It was noted that somewhat similar proton channels had been described previously in the snail neurone by Roger Thomas and his colleagues. Dr Grinstein concentrated the majority of his lecture on the new (and largely unpublished) evidence for and properties of these proton channels. During the questions, Wilfred Widdas asked the thorny question of when is a proton a proton and when is it a hydroxyl ion; in other words, could the so-called  $Na^+/H^+$  antiport actually be a  $Na^+/OH^-$  symport? Dr Grinstein affirmed that the

term  $Na^+/H^+$  exchange was an operational one. We were indeed fortunate that Dr Grinstein honoured us by agreeing to deliver this superb Designated Lecture.

Barry Hirst

## MICROVASCULAR AND ENDOTHELIAL PHYSIOLOGY

### Designated Session at King's College London

The December Meeting of the Society at King's College featured a one and a half day Designated Session which attracted a total of 29 oral and 13 poster Communications. The high calibre of oral presentations generated lively discussions until late Friday afternoon. We were particularly pleased that two oral Communications in our Designated Session were awarded Pfizer Prizes. Lisa Madge and Elizabeth Stevens received their awards at the Dinner at the Bristol Meeting in February.



The first two Pfizer Prize winners with the Society Chairman, Graham Dockray, at the Bristol Dinner

A symposium on *Endothelial Cell Signal Transduction*, organised by Jeremy Pearson, was held on Friday morning and featured key lectures on calcium signalling by Ron Jacob (London), William Schilling (Houston, Texas), Fitzroy Curry (Davis, California), Vladimir Snetkov (London) and Rudi Busse (Frankfurt, Germany). Oral Communications in the Designated Session resumed after the symposium.

### Future Meetings

The next Designated Session is scheduled for the Birmingham Meeting (15-16 December 1994) and coincides with another international symposium (14 December) entitled *Functional Plasticity of the Vascular Bed*, held in honour of Olga Hudlicka. The following key lecturers will be participating: Dr Brown, Dr Cotter, Prof Duling, Prof Gaethgens, Prof Gerova, Dr Hoppeler, Prof Reneman, Prof Renkin and Prov Vrbova.

In addition to the Designated Session at Birmingham, it is worth noting that the British Microcirculation Society will be meeting at St Mary's Hospital Medical School (28-29 March 1994; see Noticeboard).

I welcome any suggestions for future Designated Sessions and propose that, if possible, we hold a brief Special Interest Group Business Meeting at the Cambridge Meeting in July. For more information regarding forthcoming meetings, please refer to future issues of the *Magazine* or contact me on (071) 333 4450.

Giovanni Mann

## NEUROENDOCRINOLOGY

### Designated Session at King's College London

At the King's College Meeting there was a full day devoted to neuroendocrine topics. The Session, which was very well attended, commenced with a plenary lecture by Professor F Karsch entitled "Interactions of neuroendocrine rhythms in the regulation of seasonal reproduction". We were treated to a fascinating review of the subject, including a number of slides showing the excellent facilities in Michigan, where he is able to carry out studies on ewes over many seasons under controlled conditions. His main theme was the role of the pineal in seasonal physiology, but other hormonal factors influencing the patterns of breeding were discussed, including a possible contribution from the thyroid. The lecture served as an appropriate introduction for the Communications which followed.

Before lunch there were six presentations on the subject of melatonin and biological clocks. One communication on melatonin and neurohypophysial hormone release led us on to the topic of neurohypophysial hormones. Posters on a variety of topics were viewed during the lunch break. Sufficient sponsorship had been obtained to provide a very generous lunch for all those attending the Neuroendocrinology Designated Session. Quite a large group gathered in the spacious room where the Posters were set up and there was some lively discussion up to the time when the afternoon's presentations began. The neurohypophysial theme continued and then broadened out to cover the anterior pituitary and other aspects of neuroendocrinology.

### Business Meeting

After the approval of Poster Communications there was a Business Meeting at which it was decided to hold regular events, including Designated Sessions, symposia and separate meetings, supported by The Physiological Society, to be held in conjunction with other groups, such as the British Neuroendocrine Group. The frequency would depend on the calendar of the other events for the year, but we would aim for one or two meetings per year. The symposium planned for the July Meeting in Cambridge had been withdrawn, as the dates were the same as those for the European Neuroendocrine Association meeting, but other possibilities for this year are being actively explored - so watch this space!

If anyone with an interest in neuroendocrinology was not circulated with advance details of the Meeting at King's, please let me know so that your name can be added to the circulation list.

Mary L Forsling

## BLOOD-BRAIN BARRIER

### Future Meetings

The next Designated Session of the Blood-Brain Barrier Special Interest Group will take place at the Cambridge Meeting (6-8 July). This will be preceded (4-5 July) by a two day International Symposium on the Blood-Brain Barrier at King's College London. The

symposium will act as a forum for original and current thinking on the blood-brain barrier and will consist of invited platform and open poster presentations.

Further details of the participants and invited speakers, most of whom will also be attending the Physiological Society Meeting, are now available. These are shown in the table below, which demonstrates what a truly international event this should be.

John Greenwood

(See Noticeboard for further details.)

N J Abbott	UK	J-M Lefauconnier	France
W A Banks	USA	S Lightman	UK
D Begley	UK	D Male	UK
A L Betz	USA	E A Neuwelt	USA
M W B Bradbury	UK	C Nordborg	Sweden
M Brightman	USA	B Öztas	Turkey
R D Broadwell	USA	W M Pardridge	USA
A Butt	UK	G Pinter	UK
K Felgenhauer	Germany	S I Rapoport	USA
J Fenstermacher	USA	H Reiber	Germany
P Fraser	UK	W Risau	Germany
N Greig	USA	M Segal	UK
A Gjedde	Denmark	H S Sharma	Sweden
J Greenwood	UK	Q R Smith	USA
M K Gumerlock	USA	M Spatz	USA
B B Johansson	Sweden	M Wahl	Germany
H Jones	USA	R O Weller	UK
F Joó	Hungary	E M Wright	USA
R Keep	USA		

## COMPARATIVE & INVERTEBRATE NEUROSCIENCE

### Future Meeting

The next Designated Session of the Comparative & Invertebrate Neuroscience Special Interest Group will take place at the Cambridge Meeting in July. I would like to remind the Group that abstracts may be submitted for the Designated Session by anyone presenting work in this field at the Meeting. Please remember - and remind your colleagues - to specify this Session on the abstract submission form.

Cathy McCrohan

## HIGHER SENSORY FUNCTIONS

### Future Meeting

There will be a Designated Session of the Higher Sensory Functions Special Interest Group at the Cambridge Meeting of the Society in July. This will include a plenary lecture to be delivered by Professor Barry E Stein from the Physiology Department at the Medical College of Virginia. Prof Stein's lecture is entitled "Merging of the Senses", which appropriately

reflects the leading role played by his group over a number of years in studies of multi-sensory integration in the brain. His recent work has concentrated on showing that the responses on neurones in the superior colliculus and anterior ectosylvian cortex to combinations of different sensory cues match the orientation behaviour of the animal.

The Group potentially covers any aspect of sensory processing within the brain, although, with the existence of the Somatosensory Physiology Group, the emphasis is on central visual and auditory processing. I hope that as many people as possible with an interest in these areas will submit an abstract for the Cambridge Meeting. Since this is the first meeting of the Higher Sensory Functions Group, it should be possible to offer a fairly substantial number of oral Communications, although the balance between talks and Posters will be decided in conjunction with Jim Gillespie on the basis of the total number of abstracts submitted. **The abstract submission dates are 5-14 April.**

If you would like to join the mailing list, please contact either me at the University Lab of Physiology, Parks Road, Oxford OX1 3PT, tel (0865) 272523, fax (0865) 272469 or the Society's Administration Office.

*Andrew King*

#### **Designated Sessions at Scientific Meetings**

The Society has agreed that part of each Meeting can be set aside in advance for a Designated Session on a special topic. Such Sessions will run in parallel with the other sessions of Communications. Suggestions from Members for Designated Sessions at future Meetings can either be made directly to the Special Interest Group organiser or to the Meetings Secretary.

## **MUSCLE CONTRACTION**

### **New Organiser**

As some Members may know already, the job of co-ordinating the activities of the Muscle Contraction Special Interest Group has now passed into my hands.

The purpose of writing this brief note is, firstly, to thank Mike Ferenczi of Mill Hill for keeping the interests of this Group alive for many years; and, secondly, to invite your views on plans for the future. It is my intention to organise, on average, two Designated Sessions per year, at least one of which to be at a Meeting in or close to London. At this stage, I would welcome suggestions of preferred Meetings in the next 12 months, keeping to mind that the next two Meetings - or so - may be too close to organise a Designated Session properly.

Also, I have given some thought to what, in broad outline, should be the interests of our Group. It is my feeling - but I welcome alternative ideas - that "Muscle Contraction" should include all aspects of skeletal muscle physiology. Mechanics from molecular level to whole, *in situ* muscle, muscle plasticity and development, muscular exercise, energetics and E-C coupling are some fields that come to my mind immediately. It is an attempt to encourage everyone who researches on or is interested in any aspects of skeletal muscle to join the Group so that a given Session may provide a forum for wider and interactive discussion.

Finally, I hope that a significant number of Members will be contributing to and attending the Nijmegen Meeting in June. Although a formal Designated Session on Muscle Contraction could not be organised due to lack of time, we may be able to have an informal session.

*K W Ranatunga*

## **CHAIR OF PHYSIOLOGY**

### **University of Newcastle upon Tyne**

Applications are invited for the Established Chair of Physiology in the Department of Physiological Sciences. This is a key appointment for the Department which occupies modern, well equipped laboratories within the Medical School and which was rated 4A in the national UFC research selectivity exercise in 1993. We now aim to improve further our research profile by the appointment of an internationally renowned scientist to the Chair who will play a leading role in the development of research and scholarship within the Department of Physiological Sciences. It is likely that the successful applicant's research interests will complement one of the two major research strengths of the Department, namely, cellular physiology and sensory neurophysiology, but the introduction of a viable group in a new field would be equally welcome.

Further particulars can be obtained from the Senior Assistant Registrar, Medical School, University of Newcastle upon Tyne, Framlington Place, Newcastle upon Tyne, NE2 4HH. Applicants who have an international scientific reputation in any area of physiology or associated biological sciences will be considered and applications giving the name of three referees should be lodged with the Senior Assistant Registrar by not later than **25 April 1994**.

Prospective applicants who wish to discuss the appointment informally should contact Prof A Allen, tel (091) 222 6991, Head of Department of Physiological Sciences, and/or Prof A L Crombie, Dean of Medicine, The Medical School, Newcastle upon Tyne, tel (091) 222 6000 ext 7003.

## NO HYPOTHESIS, NO DATA?

Dear Editor

During discussions at the Poster approval session during the Human Physiology Designated Session held at the King's College London Meeting, concern was expressed regarding the scientific merit of some of the presentations. The two most common problems were that

- the papers did not address a clearly stated hypothesis, but merely presented data without a justification for the study or an interpretation of the results; or
- they contained no new information, or so little as to be trivial.

One abstract which was considered to come into the former category was rescued from rejection by substantial modification. A later paper was deemed to fall in the latter category and Members voted against publication. During discussions in the bar afterwards, Members seemed much more willing to be critical of papers accepted for publication than they were during the formal sessions. It would be wrong to identify individual papers in this context, but I can think of at least two papers presented at this Meeting that contain statements that are incorrect or reach conclusions that are not supported by the data. These abstracts will now, however, be published in the Proceedings and thus preserved. *Mea culpa*.

The mood of the meeting was that more rigorous criteria for acceptance of papers for publication should be applied in future and that Members should be less reluctant to vote against publication where this would not enhance the reputation of the Society. The views of other Members on what is perceived as a decline in the scientific standards of the Society would be welcome.

Ron Maughan  
Chairman

Human Physiology Special Interest Group

## MORE WOMEN FOR THE SOCIETY

Dear Editor

An important point was cut from the article on Women Physiologists (Issue No 12, February 1994) by the previous Editor, namely the reason why Tilli Tansey, Alison Brading and I think more should be done to increase the participation of women in The Physiological Society.

Less than 12% of the membership of the Society are women (assessed from the 1993 list of Members). This is much less than the percentage of women actually employed in physiological research.

Data compiled from the Universities Statistical Record for 1989/90 show that among university funded academic staff in anatomy and physiology, about 20% of the academic staff and over 30% of other research staff are women. Among staff funded by Research Councils and charities, women comprise 34% of lecturers and 55% of other staff.

This is a large part of the pool of active research workers from which Physiological Society Members are elected. We think it is a matter of concern for the Society, which should urgently consider how more women can be recruited.

Lynn Bindman

## AFTER-DINNER SEXISM

Dear Editor

We attended the recent Meeting of The Physiological Society held at Bristol. As was discussed at the Society Dinner, we are obviously all concerned with the public image of the Society. These concerns extend to making the Society an inclusive, modern organisation, in which male and female scientists are equally respected: indeed, this was the focus of the February issue of this *Magazine*. We were therefore particularly disturbed by the nature of the jokes told during the speeches at the Society Dinner, particularly as these were admitted by one of the speakers to be "politically incorrect". We would like to emphasise that a number of our colleagues (male and female) also felt that these jokes were inappropriate. Could we please refrain from making jokes at the expense of women?

We apologise for writing anonymously, but we have been advised by several Members of the Society that it would be unwise to put our names to this letter. We would like to think that the Society is more open-minded in attitude than this would suggest but we are not willing to take that chance.

Names and addresses withheld

## A STANDING OVATION

I should like to express my sincere thanks to all Members of The Physiological Society and their guests for the tremendous standing ovation and show of appreciation they gave to me at the Dinner held on Thursday 16 December 1993 at the King's Meeting. It was certainly a great surprise and their warmth and spontaneity were something I shall remember always and treasure.



Evelyn Conrad  
(left) with  
colleagues at the  
registration desk  
at the King's  
Meeting

I shall find life very different after 28 years in Physiology at King's but am looking forward to a very enjoyable retirement.

With very many thanks and my best wishes to you all for fruitful research.

Evelyn Conrad

## SPERM MONITOR OR A MOLLUSC'S DIVING BELL?

Tilli Tansey and Angela Drake-Holland examining the mystery object



Also in the Demonstration was a competition to "Guess the Mystery Object". Tastefully lit and mounted on green baize, the mystery object attracted many comments (not all reproducible here) and even some entries. Few seemed prepared to risk making fools of themselves by guessing its purpose. Some of those guesses were certainly imaginative: a diving bell for a terrestrial mollusc, a fairy's hot water bottle, or, as suggested by a recent Secretary, a 19th century apparatus for measuring sperm production. In the best traditions of the Society, he provided detailed instructions. And one wit concentrated on the perspex display box and suggested that it contained Sherrington's last breath. Other entries were more realistic, although still wrong: a heart plethysmograph, a chamber for vaporising ether, a bomb calorimeter, or, mysteriously, "a vessel for encapsulating tissue". Five entries were correct and were put in the traditional hat from which Peter McNaughton drew Edward Bower's name as the winner of a bottle of malt whisky. The object is a beautifully made kidney oncometer, as designed by Charles Smart Roy towards the end of the 19th century. It had been drawn to the Working Party's attention by Rod Adams, of the Department of Physiological Sciences in Newcastle, and subsequently donated to the Society's collection by Professor A Allen. It is a brass capsule constructed in two jointed halves, with a small aperture through which the

vessels and ureter of the experimental organ are passed. An isolated kidney is rested in the chamber surrounded by a delicate membrane made from animal tissue. The space between the membrane and outer rim of the oncometer capsule is filled with warm oil, thus providing the kidney with a surrounding cushion of oil in which it rests. The pressure in the oil-filled cavity is registered through a piston-operated oncograph, such that swelling of the kidney forces oil out of the cavity and raises the piston, excursions of which are recorded on a smoked drum. A fuller description, illustrated by detailed engravings, is given in *Experimental Physiology* published in 1911 by another former Secretary of the Society, Thomas Gregor Brodie.

We hope that the Demonstration will encourage Members to examine their own labs and departments for equipment that might have historical interest. "Historical interest" is ill-defined, but we are particularly keen to learn of post Second World War apparatus that might be incorporated into the Society's collection maintained by the Science Museum. If anyone would like to discuss or offer equipment, could they please contact either me, or any other member of the Working Party (Asa Blakeley, Angela Drake-Holland, John Ernstring, Mary Phillips and Alan Sykes).

Tilli Tansey

See close-up colour photographs on inside front cover.

## SHARPEY-SCHAFER REPUBLISHED

There can be few Members who have not at least heard of *The History of the Physiological Society*, published to commemorate its Jubilee. Written by Sir Edward Sharpey-Schafer, one of the Founder Members in 1876, it provides a fascinating picture of the Society's Members and Meetings during its first 50 years.

The book was commissioned by the Committee of 1926, who in March of that year realised that they should be celebrating the Society's 50th anniversary. Their somewhat belated recognition of the event might be excused by their preoccupations at the time in negotiating with Mrs J N Langley for ownership of *The Journal of Physiology*. Her late husband, professor of physiology at Cambridge, had bought the *Journal* from its proprietor (Michael Foster) in 1893. So at a Jubilee Sub-Committee meeting held on 24 June 1926 and chaired by Charles Sherrington, two recommendations to commemorate the event were made. Firstly, a celebratory dinner would be held to which eminent guests would be invited. The cost would be 10/6d (52.5 pence). Secondly, they would invite Sir Edward to write a historical account of the establishment and activities of the Society to date.

This Sir Edward did in a meticulous manner, effectively transcribing the highlights of the early minute books and embellishing them with his own views and anecdotes. Stylistic idiosyncracies apart,



the resultant history provides a sketch of every Meeting of the Society during its first 50 years until the AGM of 1926. It also records the election of every Member, with longer illustrated biographical accounts of those present at the first Meeting. The book is a reliable and authoritative guide to the people and problems that shaped and developed the Society.

On the completion of the manuscript, the Committee decided to have 350 copies printed and bound in the salmon-pink livery of the *Journal*. Thus, every Society Member could have one. They also had 25 copies specially printed and bound for presentation to the distinguished guests at the Jubilee dinner. These included the President of the Royal Society, Sir Ernest Rutherford, and the editors of *Nature*, the *British Medical Journal* and *The Lancet*. An additional presentation copy for the author was handsomely bound and inscribed by all the members of the Committee. This volume can be seen in the extensive collection of Sharpey-Schafer's papers that is housed in the Contemporary Medical Archives Centre at the Wellcome Institute.

After some discussion, the Committee further decided to order 500 additional copies, calculating that every Member of the Society would wish to own a copy.

With an election rate of about 20 Members per year, the supply would last for at least 25 years. Membership did not rise at this rate, not every Member bought a copy and, although the Society initiated the practice of giving complimentary volumes to newly elected Honorary Members, there were copies still available in the 1960s at the original price of 15/- (75p).

By the time of the centenary in 1976 it was more difficult to obtain a copy and the secondhand copies that began to appear in catalogues attracted prices in several pounds rather than several pence. A brief history of the second 50 years of the Society's history, by W F Bynum, was published as a paper in the *Journal* (volume 263) and is thus more widely available than its predecessor. Aware of the difficulty in obtaining copies of the Sharpey-Schafer *History*, the recently established Historical Studies & Archives Sub-Committee of the Society decided to reproduce it in time for the IUPS Congress, re-photographing a pristine volume and rebinding it in the Society's traditional pink. Thus, after a gap of many years, *The History of the Physiological Society* is again available. It can be bought for £6 from the Society's Administrative Office in Oxford or during Scientific Meetings. It must surely have a place on every physiologist's bookshelf.

Tilli Tansey

## PILLS & PROFITS: AN EXHIBITION

Health has long been sold as a commercial commodity but obviously commercial practices and styles of advertising have evolved and changed over the years.

Drawing from material in the collections of the Wellcome Institute Library, the Science Museum and the Wellcome Foundation Archives, the Wellcome Trust is staging an exhibition to show how the selling of medicines has evolved since 1870. It also traces the early history of the Wellcome scientific laboratories and shows how research came to play a crucial role in the process of making and selling medicines.

The first section of the exhibition shows the different strategies for selling medicines before 1870. Then the Victorian fashions for pill peddlars being styled as Indian "medicine men" is illustrated by a focus on the Sequah company. In the third section of the exhibition there are examples of marketing campaigns in the late 19th century and the issues raised through the proliferation of advertising during this period.

Section IV shows the establishment of the Wellcome research centre (1894) and the emerging trend of the pharmaceutical industry to create and promote a scientific image. Exhibits of manufacturing plant at the Wellcome Dartford Works provides the industrial context for pharmaceutical and scientific research. The last section of the exhibition outlines the rapid expansion of pharmaceutical advertising since the First World War.

THE BRITISH MEDICAL JOURNAL. (June 16, 1906)

### HIGH-CLASS PHARMACEUTICAL PREPARATIONS.

**SAVARESSE'S CAPSULES.**  
NOT MADE OF GELATINE.  
Being made of vegetable matter, they are free from the objection to all gelatinous capsules.



What is the best way to cure a cold? Rhinoiditis or Croup? They should be given, and not only the disease, but the patient, is cured. Savarès's Capsules of vegetable matter, being made of vegetable matter, they are free from the objection to all gelatinous capsules. They are made of vegetable matter, and are free from the objection to all gelatinous capsules. They are made of vegetable matter, and are free from the objection to all gelatinous capsules.

**EVANS' FLUID EXTRACTS.**  
The Preparation of Pharmacy. Made with special attention, they are suitable for the treatment of all diseases. They are made of vegetable matter, and are free from the objection to all gelatinous capsules. They are made of vegetable matter, and are free from the objection to all gelatinous capsules.

**ONTSERRAT Lime Fruit Juice**  
This is the best of all fruit juices. It is made of the finest fruit, and is free from the objection to all gelatinous capsules. It is made of the finest fruit, and is free from the objection to all gelatinous capsules.

**PRESCRIBE CASCARA-HAWLEY FOR CONSTIPATION.**



A reliable laxative in all cases, especially in the case of children, the elderly, and the weak. It is made of vegetable matter, and is free from the objection to all gelatinous capsules. It is made of vegetable matter, and is free from the objection to all gelatinous capsules.

**SAVAR'S Gubeb Cigarettes.**



These are the best of all cigarettes. They are made of the finest tobacco, and are free from the objection to all gelatinous capsules. They are made of the finest tobacco, and are free from the objection to all gelatinous capsules.

**SAVAR'S COCA WINE.**  
WHAT COCA WINE SHALL WE DRINK? Savar's Coca Wine is the best of all. It is made of the finest coca leaves, and is free from the objection to all gelatinous capsules. It is made of the finest coca leaves, and is free from the objection to all gelatinous capsules.

ALL ABOVE MAY BE PROCURED THROUGH TRUSTEE CHANNELS, VIA  
EVANS, LEBROER, & WEBB, 90, Northumberland Street, London. Paris & Sydney Agencies.  
EVANS, SONS, & CO., Liverpool. EVANS and SONS, Limited, Montreal.

There is no charge for entry to the exhibition, which can be found in the History of Medicine Exhibition Gallery on the fourth floor of the Wellcome Building in Euston Road. The exhibition is open Monday to Friday (9.45 am to 5 pm) and Saturday (9.30 am to 1 pm) from Friday 29 April until Friday 19 August.

## SUN TAN OR A PEPTIDE TAN?

Taking a holiday in sunny climes is a pleasant way of obtaining a sun tan, but is exposure to potentially damaging ultraviolet (UV) radiation the only way to stimulate skin pigmentation?

Skin pigmentation is the result of increased melanin production by epidermal melanocytes and, although UV is the best known stimulus of this process in man, in other animals pro-opiomelanocortin (POMC) peptides may be more important.

### $\alpha$ -melanocyte stimulating hormone

The most studied of these peptides is  $\alpha$ -melanocyte stimulating hormone ( $\alpha$ -MSH). While this 13 amino acid peptide increases skin darkening in lower vertebrates, darkens the coat of mice and stimulates melanogenesis in murine melanoma cells, its role in human skin pigmentation is unclear. In the early 1960s, Aaron Lerner and Joseph McGuire demonstrated that the administration of  $\alpha$ -MSH could stimulate skin darkening in man. Since then, Mac Hadley's group have synthesised stable, potent analogues of  $\alpha$ -MSH which also produce an artificial sun tan. However, the physiological significance of  $\alpha$ -MSH in human skin pigmentation is debatable.

In the first place, the intermediate lobe of the adult human pituitary is poorly developed so that circulating levels of  $\alpha$ -MSH are extremely low. A further complication has been the apparent inability of cultured human melanocytes to produce melanin in response to the peptide. Human melanocytes are difficult to maintain *in vitro* and it has been common practice to include artificial mitogens such as phorbol esters and cholera toxin in the medium to stimulate growth. However, these additives have adverse effects on melanocyte physiology and may block responses to  $\alpha$ -MSH.

By culturing human melanocytes in the absence of artificial mitogens, Philippe Donatien, working in our laboratory, was able to demonstrate the presence of  $\alpha$ -MSH receptors on these cells, albeit in small numbers. More significantly, we have shown that their stimulation by  $\alpha$ -MSH increases both the activity of tyrosinase, the rate-limiting enzyme in melanogenesis, and the production of melanin. These observations have now been confirmed by others. Unfortunately, these findings would seem to do nothing to support a physiological role for  $\alpha$ -MSH since the concentrations required to stimulate melanogenesis in cultured human melanocytes are many fold greater than circulating levels in healthy individuals.

### Could any other POMC peptide be important in human skin pigmentation?

The hyperpigmentation associated with Addison's disease and other adrenocortical insufficiency disorders has been thought to result from the elevated circulating levels of adrenocorticotrophic hormone (ACTH), but the effects of this POMC-derived peptide on human melanocytes were unknown. ACTH had been considered to be of little physiological significance as a pigmentary hormone in man since its melanogenic

activity in murine melanoma cells and its ability to promote darkening of frog skin are weak. However, such systems are hardly appropriate models of human skin pigmentation.

Our recent data show that ACTH stimulates melanogenesis in cultured human melanocytes and, moreover, that the cells respond to lower concentrations of this peptide than  $\alpha$ -MSH. More significantly, the concentrations of ACTH that stimulate human melanocytes are compatible with circulating levels of the peptide in healthy individuals. Thus, contrary to previous ideas, ACTH may be more important than  $\alpha$ -MSH as a pigmentary hormone in man and could foreseeably have a physiological role.

We must not forget that POMC peptides, as well as being produced in the pituitary, are also synthesised in the skin. The main site of production appears to be the keratinocytes. It has been known for a long time that keratinocytes are vital to skin pigmentation in that they receive the melanin produced in the adjacent melanocytes. The possibility that the keratinocytes may actually influence melanogenesis in a paracrine manner through the secretion of POMC peptides should now also be considered.

### So where does UV fit into the equation?

A POMC-derived peptide(s) may be one of the factors which mediates the tanning effect of UV since there is evidence that UV stimulates the local production of these peptides and up-regulates binding of  $\alpha$ -MSH to melanocytes. This could also explain why the tanning ability of administered MSH peptides is accentuated on sun-exposed parts of the body.

The recent cloning and characterisation of the melanocortin receptors has renewed the interest in POMC peptides as pigmentary hormones and has given new insight into the control of coat colour in mammals. There is every possibility that these peptides also have a role in the regulation of skin pigmentation in man and it is almost certain that they will figure strongly in future research into human skin pigmentation. Whether they can provide a safer means of tanning than exposure to UV could be one of the most interesting aspects of our research.



Gillian Hunt and Anthony J Thody  
Dept of Dermatology  
University of Newcastle Upon Tyne

*This work is supported by the MRC*

## PEPTIDES AND BLOOD FLOW UNDER THE SKIN

The mechanisms which are now known to control blood flow to different tissues and organs has become highly complex. It is no longer a simple matter of sympathetic tone. There are peptides, such as substance P and calcitonin gene related peptide (CGRP), released from branches of sensory afferent nerves through antidromic stimulation. There is the locally produced endothelial peptide, endothelin, and the notorious endothelin derived relaxing factor identified as nitric oxide. The question is how do all these vasoactive substances interact and can they influence the body's response to disease and injury? Could agents that inhibit the release and/or actions of such peptides and nitric oxide be targets for the development of therapeutic agents? We are working towards answering some of these questions.

The skin of small animal species is an ideal tissue for quantitative assays for the effects of vasoactive agents on microvascular tone and permeability. Microvascular blood flow can be measured by  $^{133}\text{Xe}$  clearance and laser Doppler flowmetry and oedema formation can be measured by  $^{125}\text{I}$ -albumin accumulation. In recent studies on the rat hind paw skin, we have looked at the activity of endogenous neuropeptides released in response to electrical stimulation of the saphenous nerve.

Our results suggest that CGRP plays a major role in the increased microvascular blood flow. It is also involved in potentiating the oedema formation which is known to be induced by substance P, or a related peptide. Such a peptide acts via neurokinin NK-1 receptors to increase microvascular permeability. Interestingly, it is thought that substance P-like peptides may be involved in the pathology of diseases that include asthma, rheumatoid arthritis and migraine. For this reason, selective NK-1 receptor antagonists have been developed which are now in the early stages of clinical trials.

However, it should be remembered that activation of sensory nerves will not only lead to release of biologically active amounts of CGRP (as shown by our studies) but probably other neuropeptides, in addition to substance P-like peptides. Therefore if the neurogenic component is considered important in inflammatory disease it might be more worthwhile to develop agents which inhibit neuropeptide release. In this context studies, including our own, suggest that  $5\text{HT}_{1\text{B/D}}$ -selective agonists and nerve-selective NO-synthase inhibitors may be of use in preventing the neurally mediated component of inflammation in the periphery.

One difficulty is to determine how our findings in skin relate to other tissues where quantitative assays are more difficult. Heather Cambridge has approached this problem by establishing a technique to measure blood flow changes in the rat knee by  $^{133}\text{Xe}$  clearance and, more recently, to directly measure synovial blood flow changes in the rabbit by laser Doppler flowmetry. CGRP is an extremely potent vasodilator, as measured by both techniques, and we are now investigating the relative importance of this

response. Other projects in the group involve the study of receptor-mediated responses, through the use of intravital microscopy techniques as well as the investigation of the sensory neurogenic component in the cerebral and pulmonary microcirculations. In particular, we are keen to learn more about mechanisms by which sensory nerves are activated to release sensory neuropeptides.

Sue Brain

Pharmacology Group and  
Vascular Biology Research Centre  
Division of Biomedical Science  
King's College London

This work is funded by the Arthritis and Rheumatism Research Council, the British Heart Foundation, Fisons, Glaxo Group Research, MRC, Pfizer Ltd, SERC, and the Wellcome Trust.

### References

- Brain, SD, Cambridge, H, Hughes, SR and Wilsoncroft, P (1993) *Proc Natl Acad Sci USA*, 657: 412-419  
Escott, KJ and Brain, SD (1993) *Br J Pharmacol*, 109: 43-49



## EXERCISE PUTS A HANDLE ON FAT

According to the 1992 National Fitness Survey, 7 out of 10 men and 8 out of 10 women do not take sufficient exercise to benefit their health. Whilst demonstrating that physical inactivity is widespread, this statement presupposes that the amount and type of exercise needed to confer health benefits is well understood. This is far from the case and, from the public health point of view, it is important to be able to define the minimum "dose" of exercise needed in this regard. So we have been looking at the physiological and metabolic consequences of brisk walking - a socially acceptable form of exercise with a low risk of injury. One of the questions we have asked is whether or not regular brisk walking can alter the profiles of serum lipid concentrations.

Endurance athletes invariably possess higher concentrations of serum high density lipoprotein (HDL) cholesterol and sometimes lower fasting concentrations of serum triglyceride than their sedentary counterparts. This may reflect an enhanced capacity to degrade triglyceride-rich lipoproteins, with a corresponding increase in the transfer of surface material to HDL. We have shown that regular brisk walking (about 2.5 hours per week over one year) results in marked increases in HDL cholesterol in previously sedentary, middle-aged women (Hardman *et al*, 1989). Moreover, this change is reversed on de-training (Hardman & Hudson, in press).

Intriguingly, we have been unable to demonstrate comparable changes in lipoprotein metabolism in men. They walked briskly for an average of 27 minutes per day over a year and despite clear improvements in endurance fitness they showed no improvement in lipoprotein metabolism (Stensel *et al*, 1993). Epidemiological studies strongly suggest that this sort of exercise habit confers a lower risk of coronary heart disease in men (Morris *et al*, 1990; Paffenbarger

*et al*, 1986) but our findings are not consistent with a mechanism that could be explained by lipoprotein metabolism. And the reason for our contrasting findings in men and women? Perhaps brisk walking represents a more modest training stimulus for men than for women or that underlying differences in the influences on lipoprotein metabolism may give rise to a somewhat different response to interventions such as increased physical activity.

However, fasting lipid and lipoprotein concentrations may not represent a sensitive measure of triglyceride metabolic capacity and we have therefore developed a postprandial model to look at the influence of exercise on lipoprotein metabolism. In particular, we are interested in the magnitude and duration of the elevation of serum triglyceride concentrations after a high fat meal. Thus we have looked at the effects of exercise before and after a high fat meal on postprandial lipaemia.

After two hours of moderate exercise (walking/jogging and cycling) in the later afternoon of Day 1, normolipidaemic young adults ingested a high fat test meal on the morning of Day 2. This modest although prolonged bout of exercise not only decreased fasting triglyceride concentrations on the following morning but also resulted in a marked decrease in postprandial lipaemia measured 14 hours after exercise (Fig 1, data from Aldred *et al*, 1993).

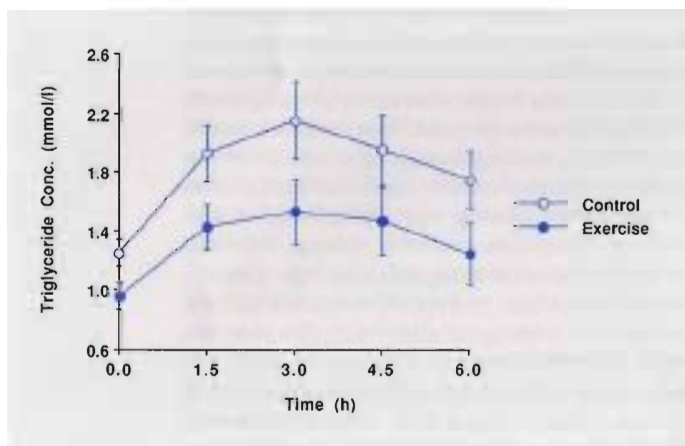


Fig 1  
Plasma triglyceride response to a high fat meal in control conditions and the morning after performing two hours of moderate exercise.  $N = 8$  (mean and sem).

In a second experiment we again measured postprandial lipaemia over a six hour period but this time subjects walked at 40% of individual maximal oxygen uptake for 1.5 hours starting 1.5 hours after consumption of the high fat meal. Over the three hour recovery period (ie 3-6 hours after the meal), lipaemia was lower than on the control trial (Aldred & Hardman, 1993). This influence on the late phase of postprandial lipaemia may be particularly important because recent evidence suggests that plasma triglyceride concentrations six or eight hours after a meal discriminate most clearly between coronary artery disease patients and controls (Patsch *et al*, 1992).

As far as differences between the sexes is concerned our experience has been that postprandial lipaemia is lower in women than in men, even when the meal consumed is related to body mass. Our data also suggest that exercise of a similar intensity relative to maximal oxygen uptake may provoke a more marked attenuation of postprandial lipaemia in women than in men. This would not be inconsistent with the findings of our longitudinal studies and justifies further examination.

A possible mechanism responsible for the decrease in postprandial lipaemia with exercise is the stimulation of lipoprotein lipase activity in skeletal muscle and/or adipose tissue. But there are conflicting reports of the time period over which this may be evident. However, stimulation of lipase activity would enhance the hydrolysis of chylomicron triglyceride, decreasing the time during which the arterial wall is exposed to high concentrations of potentially atherogenic chylomicrons and their remnants. Functionally, it would constitute the directed storage of triglyceride in a manner likely to replenish energy stores in skeletal muscle that has become depleted during exercise. As man spends a majority of his life in the postprandial state, the effect of exercise on lipoprotein metabolism may be more profound than appreciated.



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Most of this work was funded by the British Heart Foundation.

#### References

- Aldred, HE & Hardman, A E (1993) *Proceedings of the Nutrition Society* 52: 309A
- Aldred, HE, Perry, IC, Hardman, AE (1993) *Proceedings of the Nutrition Society* 52: 128A
- Hardman, A E & Hudson, A (in press) *Br J Sports Med*
- Hardman, AE, Hudson, A, Jones, PRM, Norgan, NG (1989) *BMJ*, 299: 1204-5
- Morris, JN, Clayton, DG, Everitt, MG, Semmence, AM, Burgess, EH (1990) *Br Heart J*, 63: 325-34
- Paffenbarger, RS, Hyde, RT, Wing, AL, Hsieh, C-C (1986) *N Eng J Med*, 314: 605-13
- Patsch, JR, Miesenbock, G, Hopferwieser, T, Muhlberger, V, Knapp, E, Dunn, JK, Gottlo, AM, Patsch, W (1992) *Arteriosclerosis and Thrombosis*, 12: 1336-45
- Stensel, DJ, Hardman, AE, Vallance, D, Jones, PRMJ, Norgan, NG, Brooke-Wavell, K, Winder, AF (1993) *Clin Sci*, 85: 701-708

## IMAGES OF LEAKY CAPILLARIES

One of the enduring puzzles of the microcirculation is the relationship between increases in capillary permeability and structural changes in the endothelium. The kernel of the problem is that only subtle ultrastructural alterations within the cleft between neighbouring endothelial cells are needed to account for all the measured increases in water and solute flux, while electron micrographs of the endothelium during acute inflammation often show gaps in the endothelial wall of over 0.5  $\mu\text{m}$  wide. Recently my colleagues and I have developed an approach that will allow changes in permeability to be localised to within 1 to 2  $\mu\text{m}$ . This is beginning to clarify some of the issues.

We work on brain pial capillaries that normally have a very low permeability to small polar molecules such as the fluorescent dye Lucifer Yellow and so constitute part of the blood-brain barrier. A part of the parietal lobe is exposed by removal of bone and underlying meninges leaving no impermeable tissue between the uppermost microvessels and a superfusing solution. Dye is introduced into the cerebral microcirculation and trapped in a selected vessel between a pair of micro-occluding probes. This is carried out under a microscope fitted with incident fluorescence and an image-intensifier CCD-TV camera. Under these conditions any increase in vessel permeability will result in a largely diffusive dye loss, and the rate of fall in dye concentration will be related to the vessel radius and the permeability coefficient alone. Images of the dye filled vessel are captured in an image processor. Ideally, as shown in Fig 1, the difference between the natural logarithms of the pixel values of earlier and later images will give values that are proportional to the permeability. Examples of this technique in action is given in Fig 2, and on the back cover. Since the time between taking the images, the vessel radius and the image processor constants are all well known, it is possible to calculate permeability.

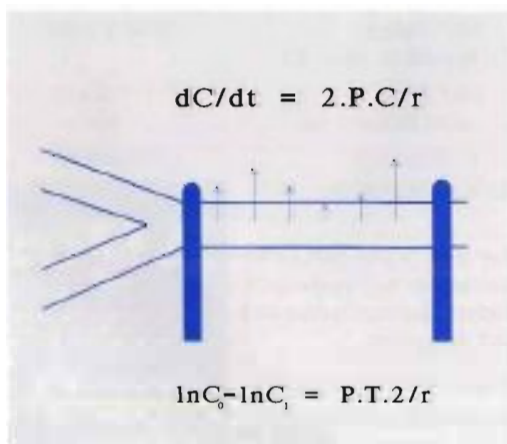


Fig 1

A schematic diagram of the experiments. Fluorescent dye is trapped between two micro-occluding needles and diffuses out of the vessel in regions of raised permeability. The rate of loss of dye from the lumen at any spot ( $dC/dt$ ) is proportional to the luminal concentration ( $C$ ). This simple differential equation may be solved as shown, thus the differences in the natural logarithm of dye concentration at two different times are equal to the permeability  $P$ , the time interval  $T$  divided by half the radius.

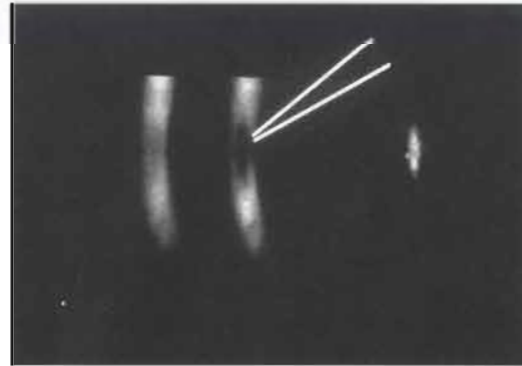


Fig 2

**Left:** a single pial venular capillary, diameter 11  $\mu\text{m}$ , with Lucifer Yellow dye in lumen. **Middle:** same microvessel 30 sec. later with 1 mM arachidonic acid applied through micropipette. **Right:** permeability map obtained from the log differences of the other two images.

There are a number of systematic errors inherent in this approach. The background fluorescence must be subtracted before logs are taken, but this background is partly due to scattered fluorescent light from the vessel itself and also decreases as the dye within the vessel decreases. The changing background can be partly overcome by including an estimated component of background due to scattered light when logs are taken. This is not entirely satisfactory and is responsible for the dotted outline of the vessel seen in some of the permeability maps. Axial diffusion within the vessel decreases the resolution of the permeability changes. This can be reduced to a certain extent by reducing the time interval between capturing the images, by selecting narrower microvessels and by using a dye with a lower diffusion coefficient, such as FITC-albumin. The disadvantage of using a larger dye is that its movement across the endothelium will be more affected by water flow than the small dyes so that, although the spatial resolution may be improved, there will be less precision over the absolute values of permeability.

In spite of some problems, this new approach to capillary permeability does give interesting information. It is also possible to extend the method by taking several sequential images and so follow the dynamics of permeability change in response to a physiological intervention.

Paul Fraser  
Physiology Group  
King's College London



Colour Photograph (back cover)

Permeability map of a venular capillary on surface of the brain. The warmer colours represent higher permeability. The dye used to fill the vessel was rhodamine-albumin and the interval between the images capture to produce this map was 31 seconds. The dots outlining the capillary are due to an artefact of changing background between the images taken. There is a region of high permeability in the lower half of this map which could represent a leak through a tight junction with a small gap close by. The peak permeability (red) in this map is  $1 \times 10^{-6} \text{ cm.s}^{-1}$  and the lowest (blue)  $3 \times 10^{-8}$

## TEACHING AND LEARNING TECHNOLOGY PROGRAMME: PROBLEM-BASED PRACTICALS FOR BIOMEDICAL STUDENTS

Computer-based practicals are slowly infiltrating our classrooms and so the Teaching and Learning Technology programme (TLTp), with its emphasis on the production and dissemination of courseware, was a timely initiative. It holds the promise of "courseware" being produced across a wide range of disciplines. Within the biomedical sciences, one consortium of academics was able to gain funding to produce courseware for student practicals. This consortium is largely from physiology departments, with experience of using A-D/D-A interfaces for student practicals.

It consists of over 40 academics from universities as far apart as London and Dundee and a courseware development team of three full time employees based at Queen Mary & Westfield College. As a whole, the consortium is just coming to the end of its first full year of project work. Aiming to produce courseware for first and second year undergraduate biomedical students, it has identified a series of practicals which are suitable for such development. Each module to be developed will

- take students through a practical, allowing them either to collect and analyse their own results or analyse pre-recorded results, and
- support this with a tutorial designed to integrate this practical experience into the body of their theoretical knowledge.
- In order to support medical or dental student education recordings taken from patients with clinical conditions will also be included.

The introduction of computers and A-D/D-A interfaces has occurred in the physiology teaching laboratories of a number of universities. They are beginning to replace the traditional chart recorders and oscilloscopes. Despite their usefulness, many systems suffered from the lack of courseware to complement the often sophisticated data capture and analysis packages on offer. Whilst in some institutions enthusiastic individuals had attempted to address this problem by writing their own courseware the general lack of availability or applicability of courseware for practicals was a constraint to the most effective use of the hardware. Data capture and analysis software, designed essentially for experienced computer users such as research staff, could also present problems of usability for the undergraduate.

Practicals are being developed within three essential areas: neurophysiology, cardiorespiratory physiology and biomechanics. The first series of three practicals is scheduled for beta release to consortium members in April. In the first instance, all practicals will be produced using Authorware Professional object oriented programming language and run under Windows 3.1. They will use Windows-based data capture and analysis software produced specifically for the A-D/D-A interface. MacIntosh versions will also be produced in due course.

Evaluation is an essential part of the project. Extensive usability evaluation needs to be undertaken as a part of courseware development, as well as an educational evaluation. This latter part of evaluation will also seek to establish the cost effectiveness of using such computer based courseware. This part of the project is being supervised by Dr N Part from the Department of Physiology and Anatomy, Dundee University in conjunction with Dr Helen Mulholland who has wide experience of evaluating computer based learning materials in the Department of Medical Education at Dundee.

University students, who are familiar with the increasing sophistication and attractiveness of computer games in everyday life, make the challenge of producing computer-aided learning (CAL) a formidable one. New skills in the preparation of academic material must be mastered in order that academic content is presented in a stimulating, yet academically acceptable way. The advances in the technologies on offer are in themselves both exciting and daunting. Not the least of the problems is to combine the expertise of academics and to provide sufficient motivation to their active involvement in projects at a time when pressures on staff time on all fronts is acute.

There is, however, growing awareness and acceptance of CAL and TLTP within universities and also the realisation of this need for co-operative cross institutional efforts such as our own. Our project welcomes contact with anyone who has an interest in its development. We can be contacted as follows:

### Project Co-ordinator

Dr M J George (071) 982 6375  
m.j.george@qmw.ac.uk

### Courseware Development Co-ordinator

Ms S Loftus (071) 982 6981  
s.loftus@qmw.ac.uk

### Subject Area Co-ordinators

Dr S Barasi (0222) 874 4107  
barasi@uk.ac.cardiff

Dr S Head (071) 723 1252  
sdh31@uk.ac.ic.sm

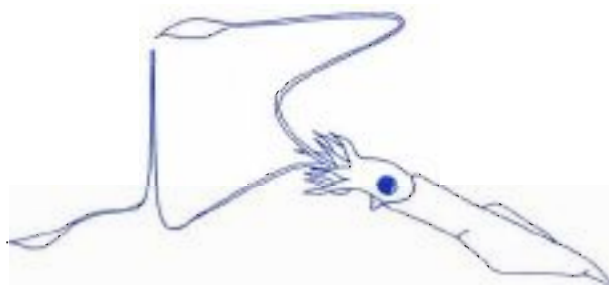
Dr D Kerwin (0609) 223269  
d.g.kerwin@lut.ac.uk

It is also hoped that Demonstrations of produced courseware will be mounted at selected Physiological Society Meetings in the near future to allow inspection and discussion.

*Malcolm George  
Dept of Physiology  
Queen Mary & Westfield College*

**MICROELECTRODE TECHNIQUES FOR CELL PHYSIOLOGY**

11th Workshop 7-12 September 1994

**Information for applicants**

The workshop provides intensive practical experience of a number of microelectrode, patch clamp and optical techniques applied to single cells. It is intended for postgraduate students, postdoctoral workers or established scientists wishing to apply these techniques in their research.

The following techniques are offered:

- Two electrode voltage clamp
- Patch clamp
- Single electrode voltage clamp
- Dye injection
- Ion-sensitive microelectrodes
- Fluorescent indicators

There are 16 places. Participants work in pairs and have the opportunity to do three three-day experiments in the two weeks. In addition, lectures and practical sessions of electronics, data acquisition & computer analysis and microscopy will be given. Daily lectures given by teachers and visiting lectures cover the basic techniques taught and certain specialised topics. A copy of the *Plymouth Microelectrode Handbook* will be provided.

The course fee is £975. This includes tuition, accommodation close to the laboratory for 14 nights, breakfast, lunch (in the lab each day) and an allowance for an evening meal. Participants are responsible for their own travel arrangements.

**Funding****MRC, SERC and NERC Studentships**

Applicants with Research Council studentships are funded once accepted for the workshop. Simply state you have a studentship in your application. Do not apply to the Research Council directly.

**Dale and Rushton Funds of The Physiological Society**

Help with funding (up to £500) is usually available for young physiologists working in the UK. If you wish to apply, simply indicate this in your application to the workshop. Do not apply to the Society directly: application will be made on behalf of candidates accepted for the workshop.

**Bursaries**

The workshop can provide some half-bursaries. If you think you will have difficulty finding the full fee, please indicate this in your application.

**How to apply**

There is no form. Give a concise description of your research, your reasons for wishing to attend and your experience of techniques taught on the workshop. List in order of preference four techniques you would like to learn.

Provide a brief CV, including a list of your publications (two sides maximum, no reprints please).

The application must be accompanied by a letter of recommendation from an academic referee, preferably your PhD supervisor or head of your laboratory. This letter should indicate how your career, the laboratory in which you work and the area of research that you intend to pursue will benefit from your participation in the workshop.

Indicate your likely source of funding.

Applications will be acknowledged on receipt. Please provide two self-addressed envelopes. A meeting to assess applications will occur during April and all applicants will be notified of the outcome in May.

Apply to: David Ogden, Microelectrode Techniques, NIMR, The Ridgeway, London, NW7 1AA, UK

Closing date for applications: 8 April 1994

**MICRO 94****International Microscopy and Image Analysis Conference & Exhibition**

The conference will consist of tutorial and review lectures, technical lectures organised by the trade and posters. Experts in instrumentation, life sciences, cytometry, cytology, cytochemistry, image analysis and image processing are invited to give the lectures. Each speaker will provide an overview of their topic, with ample time for discussion.

Contributed papers are welcomed and will appear in poster sessions. Abstracts will appear in the *Proceedings of the Royal Microscopical Society*.

Separate lectures within the conference will be organised by The Physiological Society (molecular probes for the analysis of living cells; cytometry and cytochemistry: ratio imaging and confocal scanning laser microscopy) and the Electron Microscopy & Analysis Group of the Institute of Physics. Emphasis will be placed on image processing and analysis, organised by a special interest group of the Royal Microscopical Society.

An exhibition of the latest microscopes, ancillary instrumentation and technology, of materials needed for preparation of microscopic specimens (fluorescent probes, antibodies and dyes) and software & hardware for image processing & image analysis will be held at the Earls Court Park Inn International. See Noticeboard for further details.

### THE RIGHT TO HOPE - VIDEO LAUNCH

At the age of 11, Andrew began to lose his balance. But it took three years before his worsening disability was finally diagnosed. He had Friedreich's ataxia - a rare genetic disorder which causes a crippling disease of the nervous system. His teenage dreams were shattered and he longed for a cure.

Through his hospital experiences and his explorations into the research of his disease, Andrew Blake began to understand the need for animal experimentation. Then he became aware of the animal rights activists. He saw the researchers on one side, the activists on the other. But who, he asked, was in the middle? The answer is simple. The seriously ill, who long for a breakthrough in research so that their disease can be treated.

perseverance. But the message is for us to understand what medical research really means for those who live in hope.

Every student who may have to face the issues of using animals in research should be shown this video. If nothing else, it will make them think twice about those who sit between researchers and animal rights activists. As Andrew says "No one, except for the committed idealists, would oppose humane animal research if they understood how crucial it is to medical progress".

*The video and further information about this organisation can be obtained from SIMR, PO Box 504, Houghton Regis, Dunstable, Bedfordshire, LU5 5YW, tel (0582) 864596. The video, financed by Pfizer and produced by 22 Ten Productions, runs for approximately 14 minutes and costs only £5.00.*

### MEDICAL RESEARCHERS EXCLUDED FROM NEW LEGISLATION TO CURB ANIMAL RIGHTS ACTIVISTS

Much publicity accompanied the recent publication by the Home Secretary of the Criminal Justice and Public Order Bill, since it contains proposed legislation to control protest by animal rights activists against field sports.

The proposed changes will mean that those that trespass with the intent of obstructing or disrupting a lawful activity will commit **aggravated trespass** and could be charged with a criminal offence if they disobey a direction from a police officer to leave the land. It is specified that for the trespass to be an offence it must take place on land in the open air, but excluding the surfaced highway or any part of it.

What is surprising is that this first legislation to curb the activities of animal rights extremists should not encompass some protection for those involved in biomedical research using animals. Such research in industry, universities and research institutes has undoubtedly reduced mortality and morbidity of both humans and animals. Yet it is those involved in animal research who have suffered most at the hands of animal rights extremists.

Since 1984 there have been 60 bomb attacks directed at medical researchers, some involving extremely sophisticated triggering devices akin to those used by established terrorist groups (incidentally, a designation paradoxically not used legally to describe animal rights extremist organisations). Laboratories and animal houses have been broken into, animals released or stolen, documents stolen or taken for "copying and return" - a device which enables the perpetrator to avoid the charge of theft.

The number of prosecutions following these crimes has been limited. No one has been charged for the serious crime of planting a car bomb or sending explosive packages through the post.

The Research Defence Society is concerned that the proposed change in legislation does nothing to improve the situation for those involved in the legitimate activity of animal research conducted in

Dismayed by the animal rights lobby and growing public adversity to animal experimentation, he formed a patients' group called Seriously Ill for Medical Research (SIMR) in 1991. It is an independent, voluntary organisation promoting research into debilitating and progressive diseases and supporting the humane use of animals in medical research. SIMR wants to inform the general public about the aims, methods and benefits of such research while opposing the use of animals for cosmetic testing.

As part of their campaign to make the public aware of the continuing need for animal research, the SIMR launched a video this February at the William Harvey Institute. Guest speakers at the launch were Sir John Vane and Vicky, the mother of a cystic fibrosis sufferer, Laura. The video is both a personal story and an emotive exposition in support of animal experimentation.

Having been bought up on a farm, Andrew Blake is an animal lover. We see him with his horses, his tame kestrel and his pet mouse, Bobby (short for Bob Hope), which symbolises his belief in animal research. He describes his devastation, his anger, his





accordance with the 1986 Animals (Scientific Procedures) Act. Such persons have been the prime target of animal rights activists for the last 20 years. For this reason the RDS is actively trying to persuade the Home Secretary to consider further legislation that will safeguard the activities of biomedical researchers and to protect them and their property from harassment and damage. We urge Members of The Physiological Society to add weight to this effort by expressing their views to the Home Secretary and their MPs.

**Jack Botting**  
Research Defence Society

## Animal Legislation

The Committee of The Physiological Society has an advisory group that monitors the working of the Animal (Scientific Procedures) Act 1986. Members are asked to provide any relevant information relating to its local implementation to:

Tony Angel, Dept of Biomedical Science, The University, Sheffield S10 2TN, tel (0742) 701442

Cecil Kidd, Dept of Biomedical Sciences, Marischal College, University of Aberdeen, Aberdeen AB9 1AS, tel (0224) 640618/273004

Steve Lisney, Dept of Physiology, School of Medical Sciences, University Walk, Bristol BS8 1TD, tel (0272) 303461

## RDS POSTER CAMPAIGN

Last March, for the first time in several years, the Research Defence Society produced a series of posters. Members are reminded that copies of these A3 two-colour posters are still available. Each poster has an accompanying explanatory leaflet. Please write to or telephone the RDS for copies.

## SET 7 - SEVEN DAYS OF SCIENCE, ENGINEERING & TECHNOLOGY

Science Week, or SET 7 as it has been called, is an initiative following on from the recent White Paper *Realising our Potential* from the Office of Science and Technology. This document placed considerable emphasis on the public understanding of science and pledged support for the British Association for the Advancement of Science (BA) towards this end. The week begins on 18 March and will be launched by the Rt Hon William Waldegrave. According to the BA there will be over 1,000 events "from Orkney to Plymouth and from Norwich to Belfast, involving 332 organisers in 227 towns." Over a quarter of a million visitors are expected and a similar event is already being planned for 1995. For further details contact David Butler on (071) 494 3326.

**set<sup>7</sup>**  
seven days *plus* exploring  
science, engineering  
and technology  
from 18 March

## ARTHRITIS CANCER

**TWO REASONS WHY WE NEED TO  
USE ANIMALS IN MEDICAL RESEARCH.**

Animal research can predict whether a treatment for man should be  
of benefit, of no benefit, or of  
harm to man. It is essential for the  
safety of human beings.

**ANIMAL RESEARCH SAVES LIVES.**

Animal research can predict whether a treatment for man should be of benefit, of no benefit, or of harm to man. It is essential for the safety of human beings. Animal research saves lives.



**A FEW PEOPLE IN THE UK WHO BENEFITED  
LAST YEAR FROM MEDICAL RESEARCH  
INVOLVING ANIMALS.**

Animal research can predict whether a treatment for man should be  
of benefit, of no benefit, or of  
harm to man. It is essential for the  
safety of human beings.

**ANIMAL RESEARCH SAVES LIVES.**

Animal research can predict whether a treatment for man should be of benefit, of no benefit, or of harm to man. It is essential for the safety of human beings. Animal research saves lives.



**"ANIMAL RESEARCH HELPED SAVE  
MY DAUGHTER'S LIFE."**

Animal research can predict whether a treatment for man should be  
of benefit, of no benefit, or of  
harm to man. It is essential for the  
safety of human beings.

**ANIMAL RESEARCH SAVES LIVES.**

Animal research can predict whether a treatment for man should be of benefit, of no benefit, or of harm to man. It is essential for the safety of human beings. Animal research saves lives.

## A CHILEAN EXPERIENCE

"So, what about it?" she repeated.

I was only half listening as my Chilean friend, Paulina, urged me to consider postdoc-ing in Chile. "You're mad", I mused ....

Three months later, armed with a Royal Society Overseas Study Visit Scholarship and instructions not to eat lettuce, I landed in Santiago de Chile on the other side of the world. It was April 1990 and the white heat of summer was fading. Approach of the cool winter smothered the city centre under a yellow blanket of smog. New-born bundles disappeared beneath layers of protective muslim while adults and children alike sported white surgical masks. The economic boom had increased the number of street cars by 60% in one year, with unwelcome side effects of respiratory complaints, flus and allergies.

### In the university

My working niche became the Department of Physiology & Biophysics in the looming Medical Faculty of the University of Chile. One of the best research units in the country, this prominent empire has some 20 laboratories. I was patch-clamper of cultured skeletal muscle cells. Headed by Drs Enrique Jaimovich and Cecilia Hidalgo, the lab combined electrophysiology with biochemistry in its quest to know more about muscular dystrophy. Other research interests in the Department include cystic fibrosis, neuropharmacology of membrane channels, excitation-contraction coupling, membrane transport and neuroscience.

Getting to work was frightening and exciting. Racing each other on long road stretches, the city's old belching diesel buses frequently crashed! Children selling toffees hopped on and off alongside hippy musicians and prisoners fresh out of jail. Radios blared dated rock and roll or pop late into the night.

To my delight, many people in the University spoke English, reducing any immediate need for me to spanishificate. Smiles and positive attitudes abounded. I noticed that women were dominant figures on all rungs of the research ladder, from PhD to Professor. Brothers and sisters, fathers and sons were to be found working side by side. And many researchers had other jobs too. Still badly paid, academics often need second or even third sources of income to maintain families and a reasonable standard of living.

### Calling Affiliates

The *Magazine* Editorial Group is seeking a young physiologist, probably an Affiliate, to represent the interests of younger scientists on the Sub-Committee. No experience is required, only enthusiasm and a desire to communicate in a readable style. If you have an interest in combining scientific journalism with your research career and would like to gain some experience by assisting in the production of the *Magazine*, please get in touch with me.

Saffron Whitehead

My immediate co-workers soon became friends. Freddy, blue-eyed and chirpy, was determined to babble in his best English. An indelible grin from cuddly, *guatón* Marengo launched into an enormous hug. Pato, the rude-word tutor (there's always one), piled tasty nibbles on my desk; *avellana* nuts, *manjar* (a horrible gooey fudge made by boiling condensed milk and adored by all Chileans), *jamones* (leg of ham shaped, chocolate covered marshmallow) and *camotes* (sugary sweet potato).

Marengo (centre) with friends



We lunched upstairs. Tiny roundy Señora Blanquita was a dinner lady in the true sense of the word. Squashed into a boxroom barely a yard square with her family of bubbling pans, she conjured up a vast range of goodies. My favourites were bowtie *humitas* (a corn pate wrapped in sweetcorn leaves). Not my favourites were blood sausages.

### Scientific training in Chile

Some of the students in our lab were doing PhDs. Ximena explained the training to me. It was vigorous. "We have to be able to read in English" she emphasised. Two years of demanding courses and exams with two three-month research stints in different laboratories. Students often become attached to one of these when they later begin research for their PhD thesis. But before this, the *tesilla* (little thesis) hurdle must be cleared. With 40 days and 40 nights to write a project proposal about a topic unrelated to their studies (from a choice of three), students then defend their project. Failure at this stage is a matter of definition. Depending on the specific programme, it is goodbye or retake. But most pass. And they feel like real winners. With the chance to travel abroad at this stage, many do so. The traditional private *viva voce* is followed by an official public presentation and a verdict from the jury of examiners.

Today, only about 2% of all those doing research in Chile are PhD students, compared to 50% in the USA. As a result the country produces only 20 PhD graduates each year, very low compared to nations which are demographically similar. Holland, with the same population, produces 1,200.

And after the PhD? Usually straight into a lecturing post. Sadly, Chile has never had a programme of postdoctoral training. A *carencia* in economic resources, interest and co-operation from government and industry has hampered initiatives. And the

general public do not see science as an integral part of modern culture or an important investment for the country's development. But the situation is changing. This year the government is awarding 20 postdoctoral fellowships to Chilean scientists.

### Research and funding in Chile

Science in Chile is young. In a population of over 13 million, there are some 4000 researchers in natural sciences - fewer than 300 of these are physiologists. They are concentrated in the capital, with the University of Chile and the Catholic University, friendly rivals. Provincial universities in Concepción and Valparaíso are also active. There is hardly any research in Industry and there are no private research institutes.

Biological research only began on a grand scale in the 1920s with some of the pioneers still active today. Joaquín Luco is the father of Chilean neuroscience. He formed a distinguished group, which is now one of the most active in Latin America today.

In the early 1960s, interest in electrophysiology exploded, after discovery of a squid bloom along the Pacific coast. In the Hodgkin, Huxley and Katz era, this excitement was channelled into founding Montemar, a prestigious marine research centre. A new generation of electrophysiologists was born. Today, these and other complementary techniques probe a range of research, including physiology of sensory systems, epithelia, exercise and high altitude.

Government money for research is distributed by CONICYT, the National Science and Technology Committee. Formed in 1967, this organisation awards grants through the National Fund for Scientific and Technological Development (Fondecyt). Most basic scientific research is funded in this way, with additional monies coming from the universities themselves.

While there is almost no private investment in research, applied technologies such as forestry, fishing, agriculture and mining, are largely supported privately. However, CONICYT now has a new fund, Fondef, created specifically for joint ventures between academics and industry.

Small independent institutes which help fund projects and travel include the Centre of Scientific Studies in Santiago (CECS) and the Andes Foundation. The government has also recently introduced a scheme which gives researchers a 15% top-up on their current low salaries.

### Postscript

Ten months on, standing proudly beside my poster at a large Latin American Biophysics Congress, I opened my mouth to an interested enquirer. Spanish purred out. The weird sensation of thinking in one tongue while making noises in another, made me feel mildly drunk. I enjoyed it.



*The Second Cono Sur Biophysics Congress*

I looked around. Scientists cooing to guitars strumming. Strutting cockerels waving hankies around shy hens in the *cueca*, the Chilean national dance. The poster session had just begun. Nine to midnight, a cocktail of wine, song and laughter with poster talk mixers. I was going to miss this.

*Karen Everett*



### THE SPINAL CORD: A symposium for young physiologists



The idea of this one-day symposium is to link together some of the roles that the spinal cord plays in transmitting information from one part of the periphery to another and from the periphery to the brain. It will give young physiologists an opportunity to meet others doing research in similar fields and to discuss the interaction of many factors affecting different inputs at spinal cord level.

The symposium takes place on 23 May in Bristol and will include eight short talks, with time for discussion. The day will conclude with a three-course dinner. Subsidised by the Society and the Bristol Department, this will cost only £13 including wine. (See Noticeboard for further details.)

## University of Sheffield Department of Biomedical Science

### RESEARCH AREAS FOR PHD STUDENTS FROM OCTOBER 1994:

Title	Staff
Developmental gene regulation in human teratocarcinoma stem cells	Prof P W Andrews
Mechanisms of action of anaesthesia	Prof A Angel
The role of target factors in determining connectivity in the trigeminal sensory nervous system	Dr M E Atkinson
The cytoskeleton glutamate receptors and neuronal differentiation	Dr M A Cambray-Deakin
Characterisation and distribution of receptor subtypes and their therapeutic potential	Dr R G Chess-Williams
The role of growth factors in compensatory growth, scarring and fibrosis of the kidney	Dr G H Cope
Ion channels and the regulation of intracellular $Ca^{2+}$ in endocrine cells	Dr M J Dunne
The electrophysiological basis of brain-gut interactions	Dr D Grundy
Regulation of intestinal transport	Dr J & Dr P T Hardcastle
Exercise-induced hypertrophy of muscle and nerves	Dr N T James
Intestinal secretion and absorption especially in dietary deprived states	Dr R J Levin
Ion transport across endometrium and vaginal epithelia	Dr R J Levin
Gene expression in relation to human neuropsychiatric disease	Prof R C A Pearson
Neurochemical studies of schizophrenia and the pharmacology of antipsychotic drugs and mechanisms in neurodegenerative disease processes	Dr G P Reynolds
Gastrointestinal regulation of nutrition and eating behaviour	Dr R D E Rumsey
<i>In vitro</i> studies of human fertility and the human female reproductive system	Dr M A Warren
Molecular cloning and expression of renal epithelial transport proteins	Dr S J White
Anyone interested in applying and expecting a first or upper second class degree in a relevant subject should write to Prof Angel indicating their research interest, with a CV and the names of two referees. University Bursaries may be available for qualified candidates.	
Please write to the Dept of Biomedical Science, University of Sheffield, Western Bank, Sheffield S10 2TN, tel (0742) 824660, fax (0742) 765413	

### Charing Cross & Westminster Medical School

#### Department of Physiology PHD STUDENTSHIP IN RENAL PHYSIOLOGY

A three-year PhD studentship, sponsored by the National Kidney Research Fund, is available to a suitable candidate.

Starting Date: October 1994

Current Stipend: £9,000 pa

Possible projects include:

- use of micropuncture and microperfusion techniques to investigate the sites and mechanisms of lithium reabsorption.
- use of micropuncture and microperfusion techniques, in combination with capillary zone electrophoresis, to assess the role of intraluminal peptides in nephron transport.
- investigation of the intracellular mechanisms of vasopressin-induced water transport across cultured collecting duct cells.

For further information, please contact Dr David Shirley or Dr Stephen Walter, Department of Physiology, Charing Cross & Westminster Medical School, London W6 8RF, tel (081) 846 7295 or (081) 846 7288, fax (081) 846 7338

### Charing Cross and Westminster Medical School in association with The Royal Hospital and Home, Putney POSTDOCTORAL RESEARCH ASSISTANT IN NEUROPHYSIOLOGY

to work with a group investigating sensory and motor pathways in patients with severe brain damage.

The principal techniques to be used in the studies will include sensor and motor evoked potentials, signal averaging and electroencephalography in collaboration with a clinical neurologist.

The aims of the project are to establish which neurophysiological techniques are appropriate for improving diagnostic criteria and objective monitoring of recovery, and to improve our understanding of brain dysfunction and recovery. Applicants should have a background in electrophysiological techniques and, preferably, postdoctoral experience. The development of protocols for electrophysiological recordings, and studies on normal subjects, will take place at Charing Cross and Westminster Medical School (CXWMS). Studies on patients will take place at the Royal Hospital and Home, Putney (RHHP), Charity Reg No 205907

The post funded by the Wellcome Trust, is tenable for three years. Starting salary will be up to £20,989 (including London weighting) pa, on the IA scale, depending on experience and qualifications.

Further details from: Prof Peter Ellaway at CXWMS, tel (081) 846 7293, fax (081) 846 7338; or Dr Maria Stokes at RHHP, tel (081) 788 4511 Ext 314, fax (081) 788 0737

Three copies of applications including a full CV and the names and addresses of two academic referees should be sent to the Director of Administrative Services and Personnel, The Reynolds Building, Charing Cross and Westminster Medical School, St Dunstan's Road, London W6 8RP. (Quote ref 94/09).

CXWMS is an Equal Opportunities Employer.

## EASTERN SOCIETIES

**The Indonesian Physiological Society - IAIFI**

IAIFI stands for IKARAN AHLI ILMU FAAL INDONESIA. It was founded in 1964 in Yogyakarta and the first executive meeting was held in Jakarta in August, 1965. At this meeting the first congress was planned for the end of 1968 and Bali was to be its chosen venue. Unfortunately, due to the political situation in 1965 the proposed meeting was cancelled. Instead, an executive meeting was held in Bali in January 1969 and it was decided that Bandung should be the place for the first IAIFI congress in December 1969. Since then regular congresses have been held in Indonesia approximately every three years.

Apart from congresses, IAIFI also organises seminars and workshops on particular topics. For example, workshops on Man & Traffic (Jakarta, 1970), Sports (Surabaya, 1971), Man and the Environment (Yogyakarta, 1974), Sports & Performance (Solo, 1981), Curriculum (Surabaya, 1990) and Training & Ergonomics (Yogyakarta, 1992).

As individuals or on behalf of IAIFI, some physiologists attend various interdisciplinary meetings organised by the Indonesian Science Institute, Technical Departments, Ministries or other professional organisations. Some members also try to participate in IUPS congresses but, as always, finance is a great obstacle.

The majority of IAIFI members are more concerned with applied physiology than with basic science. This has resulted both from the lack of experimental hardware and the immediate needs of the country. Recently the Second Long Term Development Programme has enlisted our expertise and the development of deep sea physiology, ergonomics, aviation and space physiology should be encouraged and developed.

To achieve these objectives, international and regional collaboration with other associations that have similar goals in enhancing the quality of life becomes a must. It is sincerely hoped that IUPS, of which IAIFI is a member, could give more attention to this issue in its future programme. By doing so, questions raised by most of our members such as "What is the actual benefit of becoming a member of IUPS?" could satisfactorily be answered.

*Adnyana Manuaba*

**The Physiological Society of Thailand**

The Physiological Society of Thailand (PST) was informally established in 1973 but it was not until early 1979 that it achieved legal status. Its main objectives are

- to encourage teachers in physiology and allied subject
- to promote research and advanced knowledge
- to foster good relationships and unity among those working in the same field
- to serve as a centre for co-ordination and exchange of knowledge with foreign institutions.

Major activities of the PST are a 3-4 day annual meeting and a one week training course in physiology and pathophysiology of various systems. These are organised and hosted alternately by different institutions.

For example, in April of 1991 the annual meeting was organised by the Dept of Physiology, Faculty of Science, Mahidol University. It was held at Khaolam Hydroelectricity Power Plant in Kanchanaburi province. The major emphasis of the meeting was on Applied Physiology in Biotechnology. Later in May, the Dept of Physiology in the Faculty of Medicine at Rangsit University (at present the only private Medical School in Thailand) hosted the training course entitled "Basic Human and Animal Physiology". This topic was designed mainly for science teachers in high schools and colleges.

In 1992, the training course was organised by the Dept of Physiology, Pramongkutklao College of Medicine, which is an army medical school. The "Physiology of Adaptation" course was held at the Faculty of Science, Mahidol University. The course emphasised marine and aviation human physiology as well as the physiology of exercise. The annual meeting was organised by the Dept of Physiology, Faculty of Science, Prince of Songkhla University at Hadyai, Songkhla province. The theme of the meeting was "Physiology of Cell Membrane".

Last year's annual meeting in May 1993 was organised by the departments of Physiology in the Faculty of Pharmacy, Mahidol University and Pramongkutklao College of Medicine. It was held at Suanson Pradipat, Prachuabkhiran province. The theme of the meeting was "Environmental Problems Affecting Human and Animal Physiology".

The 1993 training course was held during April at Kasetsart University and Kaokeo Garden, Choburi province. The title of the course was "Physiology of Wild Animals: Production for Economics and Protection".

PST has also its own publications. The biannual Thai Journal of Physiological Sciences publishes invited reviews and original research articles. Dr Chumpol Pholpramool has been the Editor of this journal since 1990. The PST Newsletter, on the other hand, is published four times a year and represents a medium through which every member of the Society may submit free communications.

PST is also preparing to publish a lexicon schema, a handbook in Thai wording so as to encourage all Thai physiologists to use the same terminology. The ad hoc committee consolidated by Colonel Somsak Borvonsin, Chairman of the Dept of Physiology, Pramongkutklao College of Medicine, has worked upon this matter since 1985.

**Future policy and direction**

This will be no different from the past. We shall try to fulfil our objectives and make more effort to strengthen co-ordination between members of the PST and other national physiological societies.

*Pranee Jaiarij*

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 June (Nijmegen) edition should reach the Administration Office by 8 April 1994.

**British Microcirculation Society  
Symposium on  
MICROVASCULAR EXCHANGE IN  
RELATION TO MICROVASCULAR  
ARCHITECTURE IN DIFFERENT  
TISSUES AND ORGANS**

**28-29 March 1994**

**St Mary's Hospital Medical School**

Further details from: Prof C C Michel, Dept Physiology & Biophysics, St Mary's HMS, Norfolk Place, London, tel (071) 723 1252, fax (071) 724 7349 ★

**British Society for Cardiovascular  
Research**

**Spring Meeting**

**CARDIAC IONIC CHANNELS,  
EXCHANGERS AND SYMPORTS**

**7-8 April 1994**

**Clifton Hill House, Bristol**

Further details from: Prof R A Chapman, Dept of Physiology, School of Veterinary Science, Southwell Street, Bristol BS2 8EJ, tel (0272) 288151, fax (0272) 254794. ★★★

**Symposium  
8-9 April 1994**

**University of California**

A symposium to celebrate the careers of Profs Hazel and John Coleridge. Further details from: C T Kappagoda or M P Kaufman, Division of Cardiovascular Medicine, TB 172 Biolett Way, University of California, Davis, CA 95616, tel (0101) 916 752 0717, fax (0101) 916 752 3264 ★

**Symposium on  
CELLULAR CONTROL OF  
CONTRACTION IN CARDIAC AND  
VASCULAR SMOOTH MUSCLE,  
COMPARED**

**11 April 1994**

**Liverpool**

To be held in conjunction with the Liverpool Meeting of the Society. Further details from: Susan Wray or David Eisner, Physiology, University of Liverpool, PO Box 147, Liverpool L69 3BX, tel (051) 794 5329, fax (051) 794 5321 ★★★

**Symposium for Young Physiologists  
THE SPINAL CORD**

**23 May 1994**

**University of Bristol**

Sponsored by The Physiological Society. Further details from: Caroline Scott or Philippa Hudson, Dept of Physiology, School of Medical Sciences, University of Bristol, University Walk, Bristol BS8 1TD, tel (0272) 303461, fax (0272) 303497 (See Young Physiologists section for further details) ★

**International Symposium  
NEW CONCEPTS  
OF A BLOOD-BRAIN BARRIER**

**4-5 July 1994**

**London**

To mark the retirement of Prof M W B Bradbury and his contribution and influence in the field of blood-brain barrier research. Further details from: Dr J Greenwood, Dept of Clinical Ophthalmology, Institute of Ophthalmology, Bath Street, London EC1V 9EL, tel (071) 608 6858, fax (071) 608 6810 (See Special Interest Group Forum for details of participants and invited speakers.) ★★

**International Symposium on  
ALPHA & GAMMA MOTOR SYSTEMS**

**11-14 July 1994**

**UMDS, St Thomas's Hospital, London**

Motoneurone inputs, motor unit recruitment, gamma reflexes, innervation patterns, sensory receptor properties, analysis and modelling, central control, pharmacology of central control, clinical implications and natural motor patterns. Further details from: Prof A Taylor, Sherrington School of Physiology, UMDS, St Thomas' Hospital Campus, London, SE1 7EH, tel (071) 928 9292 ext 2131, fax (071) 928 0729 ★

**L'Association Francaise de Nutrition  
Le Symposium Lavalisier  
METABOLIC FUEL SELECTION**

**13-16 July 1994**

**Paris, France**

Deadline for receipt of abstracts: 1 April 1994. Further details from: Pr J-F Desjeux, INSERM U 290, Hopital St-Lazare, 107 Fg St-Denis, 75010 Paris, France, tel (010 33) 1 45 23 24 07, fax (010 33) 1 47 70 28 35 ★★★

**European Neuroscience Association  
17TH ANNUAL MEETING**

**4-8 September 1994**

**Vienna, Austria**

Further details from: Marita Kloosterboer, ENA Congress Office, Keizersgracht 782, 1017 EC Amsterdam, The Netherlands, tel (31) 020 626 1372, fax (31) 020 625 9574 ★

**Biochemical Society  
BIOCHEMICAL SOCIETY MEETING**

**6-9 September 1994**

**University of Kent, Canterbury**

The major focus will be on proteins, with symposia on G-protein linked receptors, signal-transducing polypeptides, protein folding, cytokines, neuronal cytoskeletal proteins, glycoproteins and membrane proteins. Deadline for submission of abstracts: 17 June 1994. Further details from: The Meetings Office, The Biochemical Society, 59 Portland Place, London, W1N 3AJ, tel (071) 580 5530, fax (071) 637 7626 ★

**4th International Meeting on  
HIGH PRESSURE BIOLOGY**

**10-13 September 1994**

**Aberdeen, Scotland, UK**

Further details from: Dr A Macdonald, Dept of Biomedical Sciences, University of Aberdeen, Aberdeen AB9 1AS, Scotland, UK, tel (0224) 273005, fax (0224) 273019 ★★★

**The Biophysical & Physiological  
Societies of Slovenia  
1994 Conference  
LIFE SCIENCES**

**10-15 September 1994**

**Gozd Martuljek, Slovenia**

Topics include: hydration in biological systems, MRI, advanced methods in biophysics, membranes liposomes & vesicles, nerve & muscle regeneration, ion channels, cell signalling, structure and function of proteins, protein engineering, immunochemistry, steroid biochemistry, quantitative image analysis. Further details from: Samo Ribaric, Institute of Pathophysiology, Zaloska 4, 61105, Ljubljana, Slovenia, tel (386) 61 310 841, fax (386) 61 302 272 ★

**Royal Microscopical Society  
MICRO 94**

**12-15 September 1994**

**Earls Court Park Inn, London**

International microscopy and image analysis conference and exhibition, with a session on living cell cytochemistry sponsored by The Physiological Society. Deadline for submission of posters: 4 May 1994. Further details from: Royal Microscopical Society, 37/38 St Clements, Oxford OX4 1AJ, tel (0865) 248768, fax (0865) 791237 ★★

**European Society of Cardiology  
Annual Meeting and Symposium  
WORKING GROUP ON CARDIAC  
CELLULAR ELECTROPHYSIOLOGY**

**17-19 September 1994**

**Arnhem, The Netherlands**

To include a half-day symposium on Electromechanical Interactions in the Heart. Participants in any of the last three WGCCCE meetings will receive details in the spring. Further details from: Prof H J Jongasma, Rijksuniversiteit Utrecht, Vakgroep Medische Fysiologie en Sportgeneeskunde, Vondellaan 24, 3521 GG Utrecht, The Netherlands, tel (31) 30 899299, fax (31) 30 889104 or Dr H Brown, University Lab of Physiology, Parks Road, Oxford, OX1 3PT, tel (0865) 272454, fax (0865) 272469 ★

**International Symposium on  
THE PHYSIOLOGY AND  
PATHOPHYSIOLOGY OF EXERCISE  
TOLERANCE**

**21-24 September 1994**

**University of Ulm, Germany**

Organised jointly by the Dept of Sports Medicine at the University of Ulm (Prof M Stauch) and the Dept of Physiology at St George's Hospital Medical School, London (Prof B J Whipp), this symposium is designed to consider exercise tolerance in both clinical and sporting contexts and will include invited lectures, posters and discussions in: physiological basis of muscular fatigue; systemic limitations to maximum exercise in health; pathophysiology of exercise intolerance; sports-specific limitations to exercise in health and disease; enhancing exercise tolerance in health and disease. Deadline for receipt of abstracts: June 1 1994. Further details from: Dept of Sports Medicine, Organising Committee, 89070 Ulm, Germany, tel (010 49) 731 502 6961, fax (010 49) 731 502 6686 ★

## **International Society of Hypertension 16TH SCIENTIFIC MEETING 23-28 June 1996 Glasgow**

Further details from: Prof J L Reid, Dept of Medicine & Therapeutics, Gardiner Institute, Western Infirmary, Glasgow, G11 6NT ★

## **Wellcome Centre for Medical Science One day Open Meetings**

The Wellcome Centre, in collaboration with the CIBA Foundation, is organising one day Open Meetings to follow a selection of CIBA Symposia. The meetings are held in the Wellcome Trust Building at 183 Euston Road, London NW1. Registration fee: £10 (£5 for graduate students) in advance for each meeting, including refreshments, lunch and documentation. The calendar for 1994 is:

**29 April:** *Calcium waves, gradients and oscillations*

**20 May:** *Cell adhesion and human disease*

**15 July:** *Molecular biology of somatostatin and its receptors*

**2 September:** *Non-reproductive action of sex steroids*

Further information from: Sheila Pusinelli, tel (071) 636 9456 ★★

## **Intramembrane Charge Movements in Striated Muscle**

### **Monographs of The Physiological Society, No 44**

£65 hardback, ISBN 0-19-857745-1, OUP

This new Monograph by Chris Huang presents a comprehensive review of recent developments in the understanding of cellular activation phenomena in striated muscle, and covers basic physical, mathematical and physiological principles. The book consistently draws correlations both with cellular and molecular biological information and their physiological consequences and significance, and is accessible both as a survey of basic concepts and as an authoritative review of recent work in the field. For ordering details, see the Special Christmas Offers to Members from OUP, in issue No 11, (December 1993) of this *Magazine*. ★★

## **Corticospinal Function and Voluntary Movement**

### **Monographs of The Physiological Society, No 45**

£60/\$95 hardback, ISBN 0-19-857745-1, OUP

This new Monograph by Roger Lemon and Robert Porter focuses on the functions of corticospinal projections in the primate brain and discusses recent observations concerning the details of the cortico-cortical connections contributing to the determination of these functions, as well as the details of cell-to-cell connectivity. It provides a clear explanation of the cellular organisation and connectivities which allow the brain to exert precise control over voluntary movement of the fingers and the hand. For ordering details, see the tear-out Special Christmas Offers to Members from OUP, included in issue No 11 (December 1993) of this *Magazine*. ★★

## **The Pain Society**

The Pain Society represents all those who are involved in the management of pain and research into its mechanisms and relief and welcomes applications for membership from physiologists, pharmacologists and psychologists with an interest in pain. Its annual scientific meeting has a substantial scientific as well as clinical content. Its journal publishes proceedings of its meetings and other suitable material. Further details from: The Secretary, The Pain Society, 9 Bedford Square, London WC1 3RA. ★★

## **Life Science PAGES**

Contact details for scientists in university research departments in the UK, to promote communication and collaboration between researchers in medical, veterinary, biological and psychological sciences. It also contains details of scientific societies, professional and grant-awarding bodies and some life science laboratory suppliers. Further details from: Life Science Press, PO Box 267, Cardiff CF4 3YQ, fax (0222) 453061 ★★

## **Directory of UK Biological Societies, 1993-94**

A new edition has been published, giving details of societies' secretaries, activities, publications and subscriptions. Members and Affiliates may obtain copies at special rates via The Physiological Society; please contact the Administration Office. ★★

## **Alumni of the University of Leeds**

The Alumni Office of the University of Leeds is constantly seeking to locate graduates and friends of the University with whom they have lost touch. Please contact Jayne Glennon, Alumni Relations Officer, The Alumni Office, 18 Blenheim Terrace, Leeds, LS2 9HD, tel (0532) 336023. ★

## **Benevolent Fund Raffle Prizes**

At the Bristol Meeting, the Benevolent Fund Raffle was drawn at the poster approval session rather than at the Dinner. Unfortunately, none of the winners was present. The holders of tickets numbered 0685 (first prize) 0578 (second prize) and 0572 (third prize) are asked to contact the Oxford Office to claim their winnings. ★

## **Missing Members**

The Society has lost track of two Members. Diana Trenchard, formerly a member of the Midhurst Medical Research Institute in Sussex, was last known to be living in Hindhead, Surrey. Felicity Maule-Walker left the Babraham Institute in 1987, and was last known to be living in Saffron Walden, doing some part time work with disabled children for the University of Surrey. Please contact the Administration Office if you have more recent knowledge of their whereabouts. ★

## **Member's Copies of The Journal of Physiology**

Prof J W Thompson would like to dispose of his copies of the 1978-1992 volumes of the *Journal*. Anyone interested should contact him at the Education Unit, St Oswald's Hospice, Regent Avenue, Gosforth, Newcastle upon Tyne NE3 4JQ, tel (091) 285 0063. ★

## **Overseas Members**

Overseas Members receive their Meetings packets only a short time before a Scientific Meeting. As a consequence, making travel arrangements and reservations can be a problem. To help Overseas Members, booking forms for Meetings can be requested in advance of the usual delivery date from the Meetings Secretary's office.

## **Visiting Scientists**

Foreign visitors of the status of at least postgraduate student, working in laboratories of Members of the Society, may be made "Visiting Scientists" by the Society. They are then eligible to receive details of the Society's Scientific Meetings and to attend those Meetings for one year. The names of such persons, with the dates of their visits and a letter of support, should be sent to the Foreign Secretary, Prof O H Petersen, The Physiological Laboratory, University of Liverpool, PO Box 147, Liverpool L69 3BX.

## **Membership of The Physiological Society**

The minimum criteria for consideration by the Committee for inclusion on the Membership ballot (as Ordinary or Foreign Members) are:

- 1 A candidate must have given at least one Communication or Demonstration in person to the Society.
- 2 A candidate must have published at least one full research paper on a physiological subject in a reputable journal. This paper will form part of the documentation considered by the Committee, so that in the case of a paper that has more than one author details of the contribution made by the candidate must be provided.
- 3 The candidate must obtain the signatures of SIX Members of the Society who will sign a statement declaring that the candidate is well known to them, is practising in physiology or a cognate subject and is likely to remain so, fulfils the criteria for Membership and is likely to benefit from Membership of the Society and take part in its activities.

There are currently two classes of Membership for which individuals can be considered. Candidates for Ordinary Membership will reside in the British Isles or have worked for a substantial period in the British Isles or have served the Society in some significant way. Candidates for Foreign Membership will normally reside outside the British Isles.

Full details and forms are available from the Administrator (Membership), The Physiological Society, Administration and Publications Office, PO Box 506, Oxford OX1 3XE, tel (0865) 798498, fax (0865) 798092.

TITLE	AUTHOR	PAGE
Regulation of A-currents by cell-cell interactions and neurotrophic factors in developing chick parasympathetic neurones	DOURADO, Michelle M & DRYER, Stuart E	367
Synaptic transmission between single slowly adapting type I fibres and their cuneate target neurones in cat	VICKERY, R M, GYNTHYER, B D & ROWE, M J	379
A longitudinal gradient of synaptic drive in the spinal cord of <i>Xenopus</i> embryos and its role in co-ordination of swimming	TUNSTALL, Mark J & ROBERTS, Alan	393
Segmental effects of epidural spinal cord stimulation in humans	HUNTER, J P & ASHBY, P	407
Spatial relations of flicker signals in the two rod pathways in man	SHARPE, Lindsay T, HOFMEISTER, Jörg, FACH, Clemens C & STOCKMAN, Andrew	421
Activation properties of chemically skinned fibres from human isolated bronchial smooth muscle	SAVINEAU, Jean-Pierre & MARTHAN, Roger	433
Sodium current-induced calcium signals in isolated guinea-pig ventricular myocytes	LIPP, Peter & NICOLI, Ernst	439
Processes that remove calcium from the cytoplasm during excitation-contraction coupling in intact rat heart cells	BALKE, C William, EGAN, Terrance M & WIER, Withrow Gil	447
Local control of excitation-contraction coupling in rat heart cells	WIER, Withrow Gil, EGAN, Terrance M, LÓPEZ-LÓPEZ, José Ramón & BALKE, C William	463
Modulation of single hyperpolarization-activated channels ( <i>i<sub>h</sub></i> ) by cAMP in the rabbit sino-atrial node	DI FRANCESCO, Dario & MANGONI, Matteo	473
Human autonomic rhythms: vagal cardiac mechanisms in tetraplegic subjects	KOH, Junken, BROWN, Troy E, BEIGHTOL, Larry A, HA, Chang Y & ECKBERG, Dwain L	483
Chemical activation of caudal medullary expiratory neurones alters the pattern of breathing in the cat	BONGIANNI, F, CORDA, M, FONTANA, G A & PANTALEO, T	497
NMDA and non-NMDA receptors may play distinct roles in timing mechanisms and transmission in the feline respiratory network	PIERREFICHE, Olivier, FOUTZ, Arthur S, CHAMPAGNAT, Jean & DENAVIT-SAUBIÉ, Monique	509
Effects of sleep on the tonic drive to respiratory muscle and the threshold for rhythm generation in the dog	HORNER, R L, KOZAR, L F, KIMOFF, R J & PHILLIPSON, E A	525
Accommodation mediated by enteric inhibitory reflexes in the isolated guinea-pig small intestine	WATERMAN, S A, COSTA, M & TONINI, M	539

TITLE	AUTHOR	PAGE
The intrinsic gating of inward rectifier K <sup>+</sup> channels expressed from the murine IRK1 gene depends on voltage, K <sup>+</sup> and Mg <sup>2+</sup>	STANFIELD, P R, DAVIES, N W, SHELTON, P A, KHAN, I A, BRAMMAR, W J, STANDEN, N B & CONLEY, E C	1
Calcitonin gene-related peptide activated ATP-sensitive K <sup>+</sup> currents in rabbit arterial smooth muscle via protein kinase A	QUAYLE, John M, BONEV, Adrian D, BRAYDEN, Joseph E & NELSON, Mark T	9
Voltage-dependent potassium channels in activated rat microglia	NÖRÉNBERG, Wolfgang, GEBICKI-HAERTER, Peter J & ILLES, Peter	15
Effects of intracellular pH on ATP-sensitive K <sup>+</sup> channels in mouse pancreatic $\beta$ -cells	PROKS, Peter, TAKANO, Makoto & ASHCROFT, Frances M	33
Endogenous Na <sup>+</sup> -K <sup>+</sup> (or NH <sub>4</sub> <sup>+</sup> )-2Cl <sup>-</sup> co-transport in <i>Rana</i> oocytes; anomalous effect of external NH <sub>4</sub> <sup>+</sup> on pH <sub>i</sub>	KEICHER, E & MEECH, R	45
Regulation of intracellular pH in pyramidal neurones from the rat hippocampus by Na <sup>+</sup> -dependent Cl <sup>-</sup> -HCO <sub>3</sub> <sup>-</sup> exchange	SCHWIENING, Christof J & BORON, Walter F	59
Benzodiazepine and $\beta$ -carboline regulation of single GABA <sub>A</sub> receptor channels of mouse spinal neurones in culture	ROGERS, Carl J, TWYMAN, Roy E & MACDONALD, Robert L	69
Facilitatory effect of docosahexaenoic acid on N-methyl-D-aspartate response in pyramidal neurones of rat cerebral cortex	NISHIKAWA, M, KIMURA, S & AKAIKE, N	83
A comparison of non-NMDA receptor channels in type-2 astrocytes and granule cells from rat cerebellum	WYLLIE, David J A & CULL-CANDY, Stuart G	95
Electrophysiological characteristics of immunochemically identified rat oxytocin and vasopressin neurones <i>in vitro</i>	ARMSTRONG, WILLIAM E, SMITH, Bret N & TIAN, Min	115
Pulsatile secretion of oxytocin during parturition in the pig: temporal relationship with fetal expulsion	GILBERT, C L, GOODE, J A & McGRATH, T J	129
ACTH response induced in capsaicin-desensitized rats by intravenous injection of interleukin-1 or prostaglandin E	WATANABE, Tatsuo, MORIMOTO, Akio, TAN, Nobusuke, MAKISUMI, Toshiro, SHIMADA, Steven G, NAKAMORI, Tomoki & MURAKAMI, Naotoshi	139
Variable restriction of albumin diffusion across inflamed cerebral microvessels of the anaesthetized rat	EASTON, A S & FRASER, P A	147
Intrarenal haemodynamic and glomerular responses to inhibition of nitric oxide formation in rabbits	DENTON, K M & ANDERSON, W P	159
Magnetic stimulation of ferret papillary muscle	WEIDMANN, Silvio	169
Differential effects of length on maximum force production and myofibrillar ATPase activity in rat skinned cardiac muscle	KENTISH, Jonathan C & STIENEN, Ger J M	175

TITLE	AUTHOR	PAGE
Melanostatin (NPY) inhibited electrical activity in frog melanotrophs through modulation of K <sup>+</sup> , Na <sup>+</sup> and Ca <sup>2+</sup> currents	VALENTIJN, J A, VAUDRY, H, KLOAS, W & CAZIN, L	185
P-type calcium channels in rat neocortical neurones	BROWN, Angus M, SAYER, Rod J, SCHWINDT, Peter C & CRILL, Wayne E	197
Quantal and non-quantal ACh release at developing <i>Xenopus</i> neuromuscular junctions in culture	YOUNG, Steven H & GRINNELL, Alan D	207
Evidence for bilateral innervation of certain homologous motoneurone pools in man	CARR, L J, HARRISON, Linda M, STEPHENS, J A	217
Photolytic manipulation of Ca <sup>2+</sup> and the time course of slow, Ca <sup>2+</sup> -activated K <sup>+</sup> current in rat hippocampal neurones	LANCASTER, B & ZUCKER, R S	229
Phosphorylation and dephosphorylation modulate a Ca <sup>2+</sup> -activated K <sup>+</sup> channel in rat peptidergic nerve terminals	BIELEFELDT, Klaus & JACKSON, Meyer B	241
Effects of heterotopic noxious stimuli on activity of neurones in subnucleus reticularis dorsalis in the rat medulla	VILLANUEVA, Luis, BING, Zhu & LE BARS, Daniel	255
Developmental changes in hypoxia-induced catecholamine release from rat carotid body, <i>in vitro</i>	DONNELLY, D F & DOYLE, T P	267
Contribution of nitric oxide to the endothelium-dependent hyperpolarization in rat aorta	VANHEEL, B, VAN DE VOORDE, J & LEUSEN, I	277
A comparison of the effects of intracellular and extracellular pH on contraction in isolated rat portal vein	TAGGART, Michael, AUSTIN, Clare & WRAY, Susan	285
Capsaicin-sensitive stretch responses in ferret trachealis muscle	COBURN, Ronald F, MITCHELL, Howard, DEY, Richard D & ALKON, Julian	293
Sodium and potassium currents in freshly isolated and in proliferating human muscle satellite cells	HAMANN, M, WIDMER, H, BAROFFIO, A, AUBRY, J-P, KRAUSE, R M, KAELEN, A & BADER, C R	305
The intracellular Ca <sup>2+</sup> transient and tension in frog skeletal muscle fibres measured with high temporal resolution	CLAFLIN, Dennis R, MORGAN, David L, STEPHENSON, D George & JULIAN, Fred J	319
Contractile properties and temperature sensitivity of the extraocular muscles, the levator and superior rectus, of the rabbit	FRUEH, Bartley R, HAYES, Alan, LYNCH, Gordon S & WILLIAMS, David A	327
Contractile properties of single skinned fibres from the extraocular muscles, the levator and superior rectus, of the rabbit	LYNCH, Gordon S, FRUEH, Bartley R & WILLIAMS, David A	337
Force responses to rapid length changes in single intact cells from frog heart	COLOMO, F, POGGESI, C & TESI, C	347
Reflex increase in blood pressure induced by leg compression in man	WILLIAMSON, J W, MITCHELL, J H, OLESEN, H L, RAVEN, P B & SECHER, N H	351
Effect of exercise intensity on potassium balance in muscle and blood of man	VØLLESTAD, Nina K, HALLÉN, Jostein & SEJERSTED, Ole M	359

TITLE	AUTHOR	PAGE
pH dependence of inositol 1,4,5-trisphosphate-induced $\text{Ca}^{2+}$ release in permeabilized smooth muscle cells of the guinea-pig	TSUKIOKA, Michitaka, IINO, Masamitsu & ENDO, Makoto	369
Outwardly rectifying chloride current in rabbit osteoclasts is activated by hyposmotic stimulation	KELLY, Melanie E M, DIXON, S Jeffrey & SIMS, Stephen M	377
Calcium-dependent chloride current induced by axotomy in rat sympathetic neurons	SÁNCHEZ-VIVES, Maria V & GALLEGÓ, Roberto	391
$\text{K}^{+}$ and $\text{Cl}^{-}$ transport mechanisms in bovine pigment epithelium that could modulate subretinal space volume and composition	BIALEK, Steven & MILLER, Sheldon S	401
GABAergic and glutamatergic synaptic input to identified granule cells in salamander olfactory bulb	WELLIS, David P & KAUFER, John S	419
♦ Modulation of AMPA/kainate receptors in cultured murine hippocampal neurones by protein kinase C	WANG, Lu-Yang, DUDEK, E M, BROWNING, M D & MACDONALD, J F	431
Metabotropic glutamate response in acutely dissociated hippocampal CA1 pyramidal neurones of the rat	SHIRASAKI, Tetsuya, HARATA, Nobutoshi & AKAIKE, Norio	439
Interneurones in pathways from group II muscle afferents in sacral segments of the feline spinal cord	JANKOWSKA, E & RIDDELL, J S	455
Ascending tract neurones processing information from group II muscle afferents in sacral segments of the feline spinal cord	RIDDELL, J S, JANKOWSKA, E, HAMMAR, I & SZABO-LÄCKBERG, Z	469
Force-velocity relation for frog muscle fibres: effects of moderate fatigue and of intracellular acidification	CURTIN, N A & EDMAN, K A P	483
The effect of glibenclamide on frog skeletal muscle: evidence for $\text{K}^{+}_{\text{ATP}}$ channel activation during fatigue	LIGHT, P E, COMTOIS, A S & RENAUD, J M	495
Evidence for corticospinal excitation of presumed propriospinal neurones in man	GRACIES, J M, MEUNIER, S & PIERROT-DESILLIGNY, E	509
Reflex recruitment of medullary gasping mechanisms in eupnoea by pharyngeal stimulation in cats	FUNG, Man-Lung, ST JOHN, Walter M & TOMORI, Zoltan	519
Enterotoxin <i>Escherichia coli</i> STa activates a nitric oxide-dependent myenteric plexus secretory reflex in the rat ileum	ROLFE, Vivien & LEVIN, R J	531
Differential secretion of catecholamines in response to peptidergic and cholinergic transmitters in rat adrenals	GUO, Xi & WAKADE, Arun R	539
Erratum: <i>Journal of Physiology</i> 470 (1993)	ROSENBLUND, Christian & WESTBROOK, Gary L	547
Erratum: <i>Journal of Physiology</i> 472 (1993)	MINETTI, A E, ARDIGO, L P & SAIBENE, F	548
Erratum: <i>Journal of Physiology</i> 465 (1993)	BLEI, Michael L, CONLEY, Kevin E & KUSHMERICK, Martin J	548
♦ Short Paper given rapid review		

TITLE	AUTHOR	PAGE
<b>G L Brown Prize Lecture</b>		
The cellular machinery of the cochlea	ASHMORE, J F	113
<b>Full Length Papers</b>		
Secretion of acid, gastrin, and cobalamin-binding proteins by the fetal pig stomach: developmental regulation by cortisol	SANGILD, P T, HILSTED, L, NEXØ, E, FOWDEN, A L & SILVER, M	135
Role of fetal sac fluids during maternal water deprivation in sheep	DICKSON, K A & HARDING, R	147
The effect of chronic sodium depletion on renal function in conscious rats	SHIRLEY, D G & SKINNER, J	161
The effect of high phosphorus intake on calcium and phosphorus retention and bone turnover in growing lambs	WAN ZAHARI, M, SCOTT, D, LOVERIDGE, N, BUCHAN, W & MILNE, J	175
Effects of low phosphate intake on bone and mineral metabolism and microbial protein synthesis in lambs	SCOTT, D, ROBINS, S P, NICOL, P, CHEN, X B & BUCHAN, W	183
Differential effects of lipid and carbohydrate on enterocyte lactase activity in newborn piglets	TIVEY, D R, LE DIVIDICH, J, HERPIN, P, BROWN, D & DAUNCEY, M J	189
The role of cyclic AMP in the control of sugar transport across the brush-border and basolateral membranes of rat jejunal enterocytes	SHARP, P A & DEBNAM, E S	203
Carrier-mediated transport is involved in mucosal succinate uptake by rat large intestine	WOLFFRAM, S, BADERTSCHER, M & SCHARRER, E	215
Effects of low intensity infrared laser irradiation upon conduction in the human median nerve <i>in vivo</i>	BAXTER, G D, WALSH, D M, ALLEN, J M, LOWE, A S & BELL, A J	227
Rectangular hyperbola fitted to muscle force-velocity data using three-dimensional regression analysis	WOHLFART, B & EDMAN, K A P	235
Expression of <i>c-fos</i> in the ovine brain following different types of stress, or central administration of corticotrophin-releasing hormone	VELLUCCI, S V & PARROTT, R F	241
Effect of gadolinium on length-dependent force in guinea-pig papillary muscle	LAB, M J, ZHOU, B Y, SPENCER, C I, HORNER, S M & SEED, W A	249
<b>Rapid Communications</b>		
Effect of hypoxia on arterial potassium concentration at rest and during exercise in man	BARLOW, Clifford W, QAYYUM, Mohammed S, DAVEY, Patrick P, PATERSON, David J & ROBBINS, Peter A	257
Presynaptic inhibition by neuropeptide Y of slow inhibitory synaptic transmission in submucous neurones of guinea-pig caecum	CUNNINGHAM, Shauna M C, MIHARA, Satoshi & LEES, Gordon M	261
Electrical stimulation of the vagus increases extracellular glutamate recovered from the nucleus tractus solitarii of the cat by <i>in vivo</i> microdialysis	ALLCHIN, R E, BATTEN, T F C, McWILLIAM, P N & VAUGHAN, P F T	265
Calcium store depletion in dimethyl BAPTA-loaded human platelets increases protein tyrosine phosphorylation in the absence of a rise in cytosolic calcium	SARGEANT, PAUL, FARNDAL, RICHARD W & SAGE, STEWART O	269
The effect of alcohol on physiological tremor	LAKIE, M, FRYMANN K, VILLAGRA, F & JAKEMAN, P	273
<b>Book Reviews</b>		277

# *The Physiological Society*

## GRANTS AND FUNDING SCHEMES

	PURPOSE	ELIGIBILITY	AWARDS	APPLICATIONS
<b>AFFILIATE TRAVEL GRANT SCHEME</b>	To enable Affiliates to attend meetings and symposia overseas	Affiliates in the British Isles who have not already received a grant under this scheme (Eligibility continues for a year after election to Membership of the Society)	Up to £600	Applications are considered at the end of January, March, May, July, September and November
<b>BENEVOLENT FUND</b>	To assist persons who have contributed to the advancement of Physiology and are in necessitous circumstances	Physiologists, their staff and dependants	Depend on circumstances	Applications are reviewed immediately on receipt
<b>BURSARIES</b>	To support graduates undertaking MSc courses in physiological disciplines who cannot obtain funds from other sources	Science graduates of institutions in the British Isles	Up to £2,000	Applications are considered at the end of May and November
<b>DALE FUND</b>	To promote new physiological research in the British Isles	Physiologists working in the British Isles	Up to £500 for travel grants for collaborative research, learning new techniques, attending practical workshops and training courses. Up to £300 for travel to conferences and symposia	Applications are considered throughout the year
<b>EASTERN EUROPEAN AND THIRD WORLD SUPPORT SCHEME</b>	To support centres of scientific excellence where high quality physiological research is threatened by lack of resources	Centres of physiological research in Eastern European and Third World countries demonstrating scientific excellence and financial need	Up to £10,000 per annum, for up to three years	Applications are considered at the end of January, March, May, July, September and November
<b>EASTERN EUROPEAN AND THIRD WORLD VISITOR FUND</b>	To allow physiological workers in Eastern European and Third World countries to visit laboratories in the British Isles	Physiologists in Eastern European and Third World countries seeking to undertake collaborative research in the British Isles	Up to £1,500	Applications must be made by the host in the British Isles, and are considered at the end of January, March, May, July, September and November
<b>POSTGRADUATE SUPPORT FUND</b>	To assist the completion of research projects which have been delayed due to circumstances outside the applicant's control	Graduates (normally PhD students) in departments of Physiology or a cognate science in the British Isles, whose supervisors are Members of the Society	Up to £1,000	Applications should normally be submitted before 31 July, but may be considered at other times
<b>RUSHTON FUND</b>	To promote new physiological research in the British Isles	Young physiologists working in the British Isles who are not yet Members of the Society	Up to £500 for travel grants for collaborative research, learning new techniques, attending practical workshops and training courses.	Applications are considered throughout the year

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### Journals

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Two softbound issues per month in eight volumes of three issues each, plus six extra Proceedings volumes and an annual index. Price (1994 issues): £820 or \$1,575 (airmail: £262 extra) [Price to Foreign Members: £95/\$190]. Available from: Journals Marketing Dept, Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 1BR or (USA, Canada & Mexico) Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA. ISSN 0022-3751

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Six issues per annum (January, March, May, July, September & November). Price (1994 issues): £133 (airmail: £35 extra) [Price to Members and Affiliates: £35]. Available from: Journals Marketing Dept, Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 1BR or (USA, Canada & Mexico) Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA. ISSN 0958 0670

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Nos 36-42 are published by Academic Press, 24-28 Oval Road, London NW1 7DX

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### Books

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# Affiliation Form

Confidential

## APPLICATION FORM FOR AFFILIATION TO THE PHYSIOLOGICAL SOCIETY

For Office use:		
A	R	L
		---

Name (IN CAPITALS) ..... Date of Birth .....

Special Scientific Interest: (eg thesis title or postdoctoral project) .....

Interests: IUPS classes ..... / ..... / ..... Groups: .....  
(See overleaf for codes) (See overleaf for codes)

Work address .....

Tel ..... Fax .....

Electronic mail address .....

Present Course/Postdoctoral Position .....

Photograph  
of  
Candidate

### Qualifications:

Degree	Date	Subject	Awarding Institution

Please delete as applicable:

☐ I wish to receive Notices, Programmes & Magazines only.

☐ I wish to receive precirculated Abstracts as well as Notices, Programmes, & Magazines.

I enclose a cheque for £. . . . . payable to The Physiological Society.

I confirm that the information given above is accurate and up to date and that I hereby authorise The Physiological Society to hold this, and such other personal information as is supplied to the Society by me or my authorised agents or representatives in future, in machine-readable form for use for the purposes registered under the Data Protection Act 1984.

Signed ..... Date .....

Members of The Physiological Society proposing Candidates should read the Guidelines overleaf and sign the following statement.

I hereby confirm that the Candidate:

(a) is either a postdoctoral worker or registered for a higher degree in Physiology or a cognate subject, and

(b) is a person suitable for admission to Society Meetings.

Name (IN CAPITALS) ..... Signature of Proposer .....

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On completion, please return this form to: The Physiological Society (Affiliation), PO Box 506, OXFORD OX1 3XE, (UK).

## GUIDELINES TO MEMBERS OF THE PHYSIOLOGICAL SOCIETY PROPOSING CANDIDATES FOR AFFILIATION

This form of association with the Society is intended for physiologists still in the early stages of their careers working in laboratories in the UK, Eire or abroad. It is open to postgraduate students registered for a higher degree in Physiology or a cognate subject and to postdoctoral workers who are not yet Members of the Society. **It is expected that postdoctoral workers proposed as Affiliates will normally be (a) within the first five years of attaining a first professional qualification (PhD or medical degree) or (b) awaiting the outcome of their proposal for nomination for election to Membership of the Society.**

The Committee has authorised the Committee Secretary to consider and accept or reject proposals for Affiliation to the Society as they are received throughout the year, so that these can be processed quickly. The Committee Secretary regards himself as free to withdraw a proposal and return the papers to the Proposer.

Affiliation is for a term of five years in the first instance. Affiliation must be renewed by payment of the appropriate fee at the start of each year (which for this purpose is the academic year, ie October to September). For administrative convenience, Affiliates registered after October will have to pay for the full year. The fees are determined from time to time by the Treasurer; they are currently:-

	UK & Eire	Europe	Non-Europe
With Abstracts	£10	£30	£35
Without Abstracts	£ 5	£15	£20

All Affiliates receive copies of programmes, notices and the Society's *Magazine*. Affiliates can attend Meetings in their own right but must be introduced by a Member of the Society when giving a Communication or Demonstration. Affiliates are not Members of the Society and do not have the right to vote at its General Meetings.

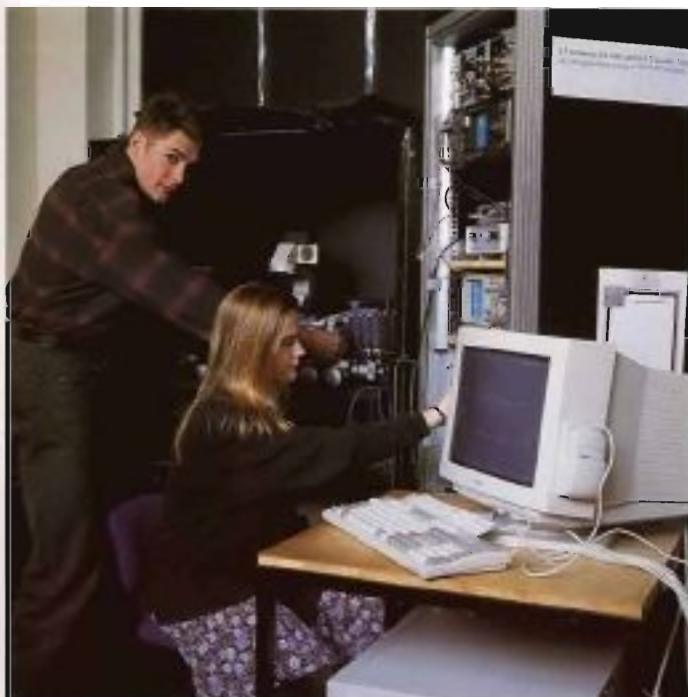
### Field of Interest:

01 Anaesthesia	16 General Physiology
02 Anatomy & Embryology	17 Immunology
03 Biochemistry	18 Liver & Bile
04 Biophysics	19 Lipids & Steroids
05 Biomedical Engineering	20 Microbiology
06 Blood	21 Minerals, Bone & Teeth
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10 Electrolyte & Water Balance	25 Pathology
11 Endocrines	26 Pharmacology
12 Energy Metabolism & Temperature Regulation	27 Radiation
13 Environmental	28 Renal
14 Enzymes	29 Reproduction
15 Gastrointestinal	30 Respiration

*You may specify up to three fields of interest.*

### Special Interest Groups Current Codes

AF Autonomic Function	HS Higher Sensory Functions
BB Blood-Brain Barrier	IC Ionic Channels
CC Cardiovascular Control	ME Microvascular & Endothelial Physiology
CI Comparative & Invertebrate Neuroscience	MC Muscle Contraction
CN Cellular Neurophysiology	NE Neuroendocrinology
CP Comparative Physiology	PP Placental & Perinatal Physiology
DP Developmental Physiology	RP Renal Physiology
EM Epithelia & Membrane Transport	RE Respiratory Physiology
GI Gastrointestinal Tract	SC Sensorimotor Control
HC Heart/Cardiac Muscle	SM Smooth Muscle
HI History of Physiology	SP Somatosensory Physiology
HP Human Physiology	



Jonathan Gale and Lesley Anson measuring cell capacitance.

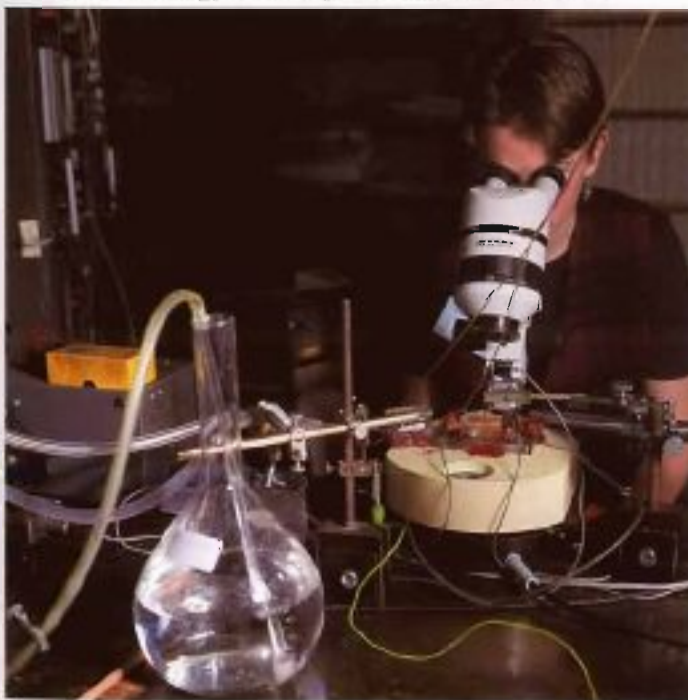


Apparatus demonstrating (D33) that external calcium modulates arrhythmia in the working rat heart.



Jane Nelson (left) and Victoria Penrice by the Society's stand

Gillian Heath examining potentiation of twitch tension in isolated muscle.



Lunch



Back cover photograph.  
Permeability map of a venular capillary on the surface of the brain.  
See the Teaching & Technology section for further details.

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