Nijmegen is situated on the river Waal, the main tributary of the Rhine.

Bridge over the river Waal.

The Grote market, the centre of the old town.

Negotiating the back streets of Nijmegen.

The Joint Meeting was held at the Catholic University of Nijmegen.

Delegates exchanging gossip outside the Medical School, venue for the Joint Meeting.

The Society Dinner was held at Kasteel Doornenburg.

Guests were serenaded by minstrels and served roast sucking pig.

Front cover photograph
Marischal College
Courtesy of Public Relations, University of Aberdeen
Contents

Letter from the Editor ................................................................. 1
The Aberdeen Meeting ............................................................... 1
The 1994 Paton Lecturer: a biographical sketch of John Wendell Severinghaus, MD ..................... 1
Physiology at Aberdeen - Cecil Kidd ........................................ 1
Committee News ....................................................................... 1
Support for New Lecturers ...................................................... 4
Grants for Japanese and Korean Meetings ................................. 4
Helping Physiologists in Eastern European and Third World Countries ........................................ 4
Journal Subscriptions: Special Rates for Members, Affiliates & Departments ............................... 5
Joint Meeting in Japan and Korea: 1995 - Ole Petersen ............ 5
The Benevolent Fund - Peter McNaughton ............................. 6
Historical Studies & Archives Sub-Committee - Cecil Kidd ....... 7
Special Interest Group Forum
Cardiovascular/Respiratory Control, Cellular Neurophysiology, Comparative Physiology and Comparative & Invertebrate Neuroscience, Heart & Cardiac Muscle, Human Physiology, Microvascular & Endothelial Physiology, Muscle Contraction, Neuroendocrinology, Placental & Perinatal Physiology, Renal Physiology, Smooth Muscle, Somatosensory Physiology
- Michael P Gilbey, Alex Thomson, Cathy McCrable & Ted Taylor, Godfrey Smith, Ron Maughan, Giovanni E Mann, K W Ranatunga, Mary Forsling, Mark Hanson, David Potts, Lucilla Poston & Jeremy Ward & Rob Clarke ........................................ 8
Letters ................................................................................. 13
Discovery of Adrenaline: the Polish Connection - Andrej Trzebski ................................................. 13
Legalisation of Cannabis - Vernon Pickles ................................ 13
Voting for Publication: Censorship? - H Hillman ....................... 13
Traces of the Past .................................................................. 14
No Prizes This Time: the Lucas Pendulum Contact Breaker - Alan Sykes ......................................... 14
The Pictorial Record of Physiology - Tilli Tansey ...................... 14
Welcome Trust Takes Over National Medical Slide Bank - Reg Chapman ................................. 16
Anniversary ........................................................................... 17
Henry Barcroft, FRS: 90 years - David Greenfield ..................... 17
Science News & Views .............................................................. 18
Old Age, Less Strength - Joan Bassey ........................................ 18
The Strengthening Hormone - Roger Woledge ............................ 19
Breathing into Old Age - Susan Ward ........................................ 19
Teaching & Technology ........................................................... 22
Secretion Accretion: Looking at Exocytosis - Terry Newman .................................................... 22
Projects: an Alternative to Undergraduate Practical Classes - Peter McNaughton ......................... 23
Join the Information Revolution: Use EMail! - Roger Thomas .................................................. 25
Young Physiologists ................................................................. 26
A Day at Bristol: Spinal Cord Symposium Report - Caroline Scott & Philippa Hudson ...................... 26
News from Abroad .................................................................... 28
Physiology in Hong Kong - Fazlul Karim ................................. 28
Journal Contents ..................................................................... 30
Noticeboard .......................................................................... 36
Grant Application Form for Joint Meeting in Japan ............... 39
Affiliation Form ..................................................................... 41

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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 below).

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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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Dear Readers,

I think the Magazine does provide some sort of communicative forum for Members of the Society, so please keep those ideas for articles, letters and humorous fillers rolling in. Our next challenge is to raise the profile of Physiology in the Media. No easy task in a highly competitive market, but with the help of Deborah Hood, I am trying to make some serious inroads in this direction. However, we need lots of input which could provide text for newsworthy stories, articles for feature pages and ideas for the science programmes on radio and television. I may be able to turn experiment to story, but I need that initial impetus from physiologists who feel that their research is in the process of generating news for the press. Media coverage is not to be disparaged but rather encouraged for obvious reasons. So, yet again, another request to Members of the Society. If you have anything exciting going on in your lab, please phone, write and we'll discuss.

Saffron Whitehead

THE 1994 PATON LECTURER:
JOHN WENDELL SEVERINGHAUS, MD - A BIOGRAPHICAL SKETCH

John Severinghaus will deliver the 1994 Paton Memorial Lecture entitled "A history of blood-gas and acid-base measurements" at 5.30 pm on Wednesday 14 September.

Dr. Severinghaus is Professor Emeritus of Anaesthesia at the University of California in San Francisco, where he has been a senior staff member of the Cardiovascular Research Institute since 1958. Born in Madison, Wisconsin in 1922, he initially studied physics at Haverford College, and worked on radar at MIT during World War II. Intending to pursue a career in biophysics, he went on to study medicine at Wisconsin and Columbia. His initial research (during internship) developed a flame photometric method for calcium analysis (1949). During his anaesthesia residency with Robert Dripps at the University of Pennsylvania, he made the first measurements of the uptake of N2O during clinical anaesthesia. After a postdoctoral fellowship with Julius Comroe at the University of Pennsylvania, he spent three years at NIH studying respiratory physiology and gas exchange, especially in human hypothermia. In 1954 he developed the Stow-Severinghaus PCO2 electrode and later combined it with Leland Clark's O2 electrode and a pH electrode to develop the first blood gas apparatus, now at the Smithsonian museum.

In 1958, after completing his anaesthesia residency with Stuart Cullen at Iowa, John Severinghaus moved with Comroe and Cullen to UCSF as Director of Anaesthesia Research in the Cardiovascular Research Institute, and the new Department of Anaesthesia. He held a Research Career Award from NIH from 1963 to 1991. His 390 publications concern chemical regulation of respiration, the discovery (with associates) of the brain's CO2 chemoreceptors, effects of anaesthetics, aclimatisation to high altitude, regulation of cerebral blood flow, causes of high altitude pulmonary oedema, development of blood gas and monitoring methodology, definition of the standard O2 dissociation curve, design of a blood gas slide rule, transcutaneous PCO2 electrodes, instrumentation in anaesthesia, multiplexed mass spectrometry for multi-patient monitoring in surgery, and testing performance and accuracy of pulse oximetry in human subjects. He has authored or co-authored five books, two on the history of blood gases and acid base balance. He continues in full time research at UCSF, despite official retirement, with interests in the biochemical causes of high altitude cerebral oedema, the theory of oxygen delivery to muscle cytochrome in maximum work, and instrumentation in anaesthesia.

John Severinghaus served as NIH liaison to the National Research Council of the National Academy of Science (1953-58), as member of an NIH study section (1961-66) and as editor of the Journal of Applied Physiology (1964-66). His honours include the Borden Undergraduate Award (1949), the Bicentennial Silver Medal of Columbia University (1967), the Joseph Mather Smith Prize (Columbia University, 1967), Fellow by election of the Faculty of Anaesthetists of the Royal College of Surgeons of the UK (1975), Doctor of Medicine Honoris Causa at the 500th anniversary of the University of Copenhagen (1979), UCSF Honorary Faculty Research Lecturer (1981), Fellowship of the AAAS (1982), Litchfield Professor of Oxford University (1985), First ASA Award for Excellence in Research (1986), Honorary Fellowship of the Royal College of Anaesthetists (UK) (1989), and about 30 eponymous or honorary lectures and 25 visiting professorships in the US and abroad.

PHYSIOLOGY AT ABERDEEN

The University

In 1995 the University of Aberdeen celebrates the Quincentenary of the founding of King's College (1495) at Old Aberdeen and last year was the Quartercentenary of the founding of Marischal College (1593). Following 300 years of academic rivalry in the same city, the two previously independent institutions merged in 1860 to form the modern University of Aberdeen. This year the University is celebrating the centenary of the admission of women as fully accredited students: a plethora of celebrations.

The Department

The subject of Physiology was explicitly identified in the original Charter for Marischal College and the Principal was charged with teaching it together with Hebrew, Syriac, anatomy, geography, history and some astronomy. There are no records extant of the nature or quality of such teaching - no audits in 1583. The Department was effectively established at the time of fusion, though lectures to medical students had been delivered at Marischal for many years prior to the establishment of the Regius Chair in Physiology in 1860.
Notable previous holders of the Chair and Heads of Department include J.A. MacWilliam (1885-1927), who did pioneering work on the propagation of the cardiac impulse and was the first to ascribe "sudden death" in humans to ventricular fibrillation. Another graduate and holder of the Chair was J.R. Macleod (1927-38), who returned to Aberdeen from Toronto after the award of the Nobel Prize, with Banting, for the discovery of insulin. As an aside, I was interested to see, in one of the Society's recent publications, that the discovery of insulin was firmly ascribed to the Canadians, Banting and Best. Macleod, who was one of the most distinguished Members of the Society, was excluded. The full story is a fascinating one which has been set out extremely well by the Canadian historian Michael Bliss - we really should get our facts right and not promulgate old myths.

In 1990, the three departments of Anatomy, Physiology, and Pharmacology were merged to create the present Department of Biomedical Sciences responsible for all three disciplines. Currently the Department has an overall SHEFC-funded complement of about 30 academic and academic-related staff (four professors, including Steve Logan, who was recently appointed to the Chair in Neuroscience, ten Readers/Senior Lecturers, 12 Lecturers and three Teaching Fellows). Charities, Research Councils, and Industry provide the essential and substantial external support for our research programmes and maintain a lively population of Research Fellows and Assistants. Several Honorary appointments at Chair and other senior levels enable us to recognise contributions to both teaching and research by individuals in Research Institutes and Industry. The current holder of the Chair and Head of Department is Cecil Kidd.

Research

This is structured across the Department over four main themes involving all three disciplines:

- Neuroscience, which has developmental, molecular and integrative threads
- Mammalian systems physiology and pharmacology
- Physiology of extreme environments
- Membrane-molecular physiology and pharmacology

Specific research programmes are headed by members of academic staff and a brief description is given below.

Steve Logan’s group is just setting into the Department. It has interests in neurotransmitters and transduction mechanisms in sympathetic preganglionic neurones and are looking at the biophysics in relation to channel expression and the mechanisms underlying amino acid and peptide neurotransmitter actions. Steve Spanswick will join them at the turn of the year following a period in Japan. Steve Davies and his group are examining LTP mechanisms in the hippocampus with particular interest in the role of metabotropic receptors. Colin McCaig’s group are investigating the mechanisms which underlie the effects of small electric fields on the development and regeneration of neurones and muscle cells.

Norman Cameron and Mary Cotter have a joint research programme and their group is focused on the control of nerve blood flow and its influence on nerve function in experimental diabetes mellitus, related disease states and ageing. They also have an interest in the various control factors which determine skeletal muscle function during the course of normal development and disordered function. Gordon Lees has a longstanding involvement in the innervation of the GIT in health and disease and currently has a major interest in the functions of the several neuropeptides to be found in the plexuses of the wall of the large bowel in humans and animals. The combination of electrophysiological recording and immunohistochemical identification of specific neurones continues to be highly productive.

Alistair Corbett works in collaboration with a pathologist, Graham Murray, on the characterisation of endogenous opioid peptides in human colon with particular reference to inflammatory bowel disease. Roger Fertwee’s group are examining the neuropathology of cannabinoids and they are currently focused on the further characterisation of an endogenous cannabinoid ligand identified in the nervous system. They are working towards the identification of potential physiological roles for such ligands through the development of antagonists. Mark Wallace examines the development of cerebrocortical circuits in the auditory cortex of neonatal and young ferrets as well as having an emerging interest in the role of nitric oxide synthase expressed in glial cells following injury to the cortex. Alister Hunter is using a structural approach in a chick model to elucidate the microstructural changes in synapses which accompany learning.

Cecil Kidd continues to develop his interests in the mechanisms and roles of non-myelinated vagal afferents from the heart and lungs and, with Frank Bowser-Riley, an examination of the changes and mechanisms underlying alterations in cardiovascular reflex function in humans and animals exposed to hyperbaric conditions and cold. In collaboration with orthopaedic surgeons, the lab also has an interest in the mechanisms which modify blood flow in spinal nerves. Frank Bowser-Riley continues to pursue his interests in the nature of the actions of high pressure on the nervous system. Tony Milton works on the cellular events involved in the pathogenesis of fever and the immune response, with a particular focus on the role of cytokines and prostaglandins.

The membranes theme also includes a heterogeneous group of research programmes. Alister Macdonald, well known for his high pressure studies, is currently looking at the dynamic properties of membrane channels, using fluorescent and patch clamp approaches. Studies of the effects of anaesthetics on cockroach muscle and altered membrane lipid composition in endothelial cells are ongoing. Ken Page continues his interests in human placental transport and the effects of smoking with a specific focus on the movements of amino acids and zinc. Much of the work is being carried out in collaboration with David Abramovitch in Obstetrics and Danny Burke in this department. Gordon
McEwen, who recently joined us from Newcastle, has interests in the cellular and molecular aspects of epithelial function. His laboratory is looking at ion transport mechanisms in intestinal epithelia, especially chloride channels, paracellular fluid movement and intestinal and renal tubular transport systems affected in diarrhoea. More recently, Mercedes Acevedo has joined the Department (August 1994) and will pursue her interests in channel mechanisms in apical and basal membranes of the ciliated epithelia of the respiratory tract.

Heather Wallace has a major interest in the regulation of cell growth by polyamines; this extends to the mechanisms of malignant cell growth. The role of polyamines, in a cytoprotective mode of operation in relation to cell damage by reactive oxygen species is currently of substantial interest to her group. Finally, Gabrielle Hawksworth and Danny Burke, both of whom are biochemical pharmacologists, have independent teams who pursue their interests in the characterisation, regulation and clinical relations of human drug metabolising enzymes with special emphasis on the kidney and liver. Cultured human proximal renal tubular and interstitial cells are used as well as human hepatocytes.

Teaching

Physiology is taught to medical and science students with the load being distributed about 50-50 overall. The undergraduate load for the Department is ca 315 FTE. Currently, medical students (intake: 155) do a conventional preclinical course over five terms but this will undoubtedly change with a new curriculum. This is due in October 1995 and is designed around the recent GMC report. In respect of the four year Honours science degree programmes, we offer these in two single discipline schemes of Physiology and Pharmacology and three integrated degree schemes of Neuroscience, Biomedical Sciences and Human Life Sciences. These are taught in conjunction with associated departments such as Molecular & Cell Biology, with contributions to the former from Psychology. Medical students can take an intercalated Honours BSc (Med Sci) in any of the preclinical or major clinical departments. All teaching in science has been organised into a modular form and an increasing proportion of our courses are interdisciplinary.

In the first year all biological science students take common faculty-based courses to which we contribute. In the second year the Department offers two semester-long courses in mammalian and human physiology taken by substantial numbers of students from outside the Department. Third and fourth (Honours) year courses are restricted largely to students on one of the departmental degree schemes. We continue to run separate courses for medical and science students and this is likely to continue with the new curriculum in medicine. Students in the Biomedical Sciences Honours degree programme shadow the medical courses for the first two years before taking specialist advanced courses.

Computer Assisted Learning

The Department has a strong base in computer-assisted learning, with access to two substantial microcomputer networks. We are a lead department in a highly successful TLTP network, which involves a large number of other preclinical and biological departments, and participate in two others. Frank Bowser-Riley is Co-ordinator and many members of the Department contribute to the development of computer based material. This is used both for the training of students in information acquisition and manipulation and for written and oral presentation as well as specific physiological teaching programmes and simulations. In 1992, the Department won the IBM (UK) Prize for Information Technology Skills. This was awarded by the Partnership Trust for a physiology course developed by Frank Bowser-Riley, Mike Radcliffe and Greg Newman. It is available to our third year students and the principles underlying that course have now been extended to others at several different levels in the Department.

The Department has a lively and substantial postgraduate population on PhD, MPhil and MSc programmes: in total, the postgraduate FTE load is ca 30, which means approx 40 individuals. The MSc course in Human & Mammalian Physiology is designed on a flexible basis which allows an appropriate balance between research and course material - depending on the needs and previous experience of the participants.

Accommodation

For many years the Department has been based at Marischal College but progressively other academic departments have been moved to the King's College site. Now only two remain at Marischal College: Molecular & Cell Biology and ourselves - although there are plans to move both departments out to the Foresterhill site close to the clinical academic departments and the ARI. A new Institute of Medical Sciences (IMS), which brings together preclinical and other medical sciences in an integrated facility, is being developed together with new accommodation for teaching. The whole project is likely to take 5-6 years before completion.

In conclusion, we welcome you to Aberdeen and hope that both the science and social activities are rewarding and enjoyable. Unfortunately, because of building operations at Marischal, we have had to move the whole Meeting out to the King's site at Old Aberdeen. This has the benefit of accommodation, science and social activities all being close together, but we will not be in our Department. However, we look forward to seeing you in September.

Cecil Kidd
**SUPPORT FOR NEW LECTURERS**

The biggest hurdle encountered by young physiologists, in their first position on the academic staff of a university department, is to obtain sufficient external support (from research councils or the major medical charities) to allow the development of an independent research programme. Quite commonly, they are unable to do any research unless they obtain external support, since the breakdown of the Dual Support system has meant that university departments are often unable to provide sufficient support for even pilot experiments.

The Committee has therefore agreed to establish a scheme for the support of young physiologists newly appointed to their first university lectureship, to assist them in establishing themselves as independent researchers. Members and Affiliates of the Society who have taken up their first such appointment within the last 12 months may apply for grants of up to £5k for consumables, equipment or, in exceptional cases, technical help.

A budget of £20k per annum has been allocated to this scheme in the first instance, with the possibility of increased allocations in future should sufficient applications of high quality be forthcoming and the success of the scheme be demonstrated. One measure of success would be the proportion of grants which lead to awards from major competitive peer review funding bodies or to substantial peer reviewed publications. Successful applicants will therefore be required to submit reports within 12 months of the funding date, describing the work done and the outcome in the above terms.

The first deadline for applications is 30 September 1994. Further information and application forms are available from the Administration Office, PO Box 506, OXFORD OX1 3XE, tel (01865) 798498, fax (01865) 798092.

**G L BROWN PRIZE LECTURE**

The G L Brown Lecturer for 1995 is Richard Vaughan-Jones of the University Laboratory of Physiology, Oxford. The Lecture can be given from January until 1 November, so that all applicants can be informed of the outcome before the opening of the abstract submission period.

**GRANTS FOR JAPANESE AND KOREAN MEETINGS**

The Society has allocated £50,000 to assist younger Members and Affiliates of the Society to attend the Joint Meeting with the Japanese Physiological Society and the joint symposium in Korea. Of this sum, £15,000 has been earmarked for Affiliates, so those eligible should apply using the form at the back of this Magazine, not via the Affiliate Travel Grant Scheme. Applicants should be planning to submit abstracts for the meeting. The closing date for applications is 14 November, so that all applicants can be informed of the outcome before the opening of the abstract submission period.

**HELPING PHYSIOLOGISTS IN EASTERN EUROPEAN AND THIRD WORLD COUNTRIES**

The Committee has developed a portfolio of ways of assisting physiologists in countries where economic problems hamper scientists in their work and has recently increased the overall budget for such support. The forms of support available fall into two categories: support for individual physiologists to travel outside their country and support for their home institutions.

**Support for individuals**

The Eastern European and Third World Visitor Fund, now in its first year of operation, provides grants of up to £1,500 to cover the cost of travel to the British Isles and living expenses for a few months. Further information and application forms are available from the Administration Office. Sponsored Foreign Visitors are encouraged to participate in Society activities so that, if a visit coincides with a Society Meeting, further funding may be available to cover travel to and accommodation at the Meeting as a Foreign Guest.

The status of Foreign Guest is not accorded only to those sponsored from the Visitor Fund. The Foreign Secretary may issue invitations to Society Meetings to other persons suggested by Members of the Society or by heads of departments hosting Meetings and, in appropriate circumstances, part or all of the air fare to the British Isles may be met from the Foreign Guests budget. See Section K of the Standing Orders in the Grey Book for further details.

The Foreign Secretary also has an annual budget of £5,000 from which physiologists from the Third World and Eastern Europe can be assisted to attend Workshops sponsored by the Society.

New Ordinary members of the Committee elected at the 1994 AGM.

Left to right: Bridget Lumb, Richard Ribchester, Philip Harrison, David Attwell.
Support for institutions
The Eastern European and Third World Support Scheme, also in its first year of operation, exists to provide support for centres of scientific excellence where the high quality of physiological research is in danger of being eroded or threatened by severe financial problems and lack of resources. Applications for support must be made via a sponsor in the British Isles, preferably a Member of the Society. Further information and forms are available from the Administration Office but Members are encouraged to contact the Foreign Secretary before applying.

The Society has for many years maintained a "Freelist" of institutions to which copies of its journals are sent free of charge. This originated a couple of decades ago when the Polish economy suffered a downturn and libraries there which had been subscribing to The Journal of Physiology requested free copies until some recovery was in sight. The Freelist has gradually been expanded, extended first to Experimental Physiology, then to the Society's Magazine and News in Physiological Sciences, and the number of institutions receiving some or all of these publications has been steadily increasing. The budget for the Freelist has recently been increased and any Member who would like to recommend an appropriate institution where a large number of physiologists could benefit from access to one or more of these publications is encouraged to contact the Honorary Treasurer.

JOURNAL SUBSCRIPTIONS: SPECIAL RATES FOR MEMBERS, AFFILIATES AND DEPARTMENTS

The Journal of Physiology
The Journal is again being offered to eligible departments in Physiology in the UK and Eire for only £100 for the full set of 1995 volumes. This is the sixth year running that the price for departments has been held constant, with no increase for inflation! See Standing Order H2 in the Grey Book for details of the requirements for eligibility.

The special subscription rates offered to Foreign Members have also been held at last year's rate. Foreign Members who qualify can therefore obtain the 1995 volumes of the Journal for only £95 ($190) for those resident in North America) compared with the 1995 commercial subscription rate of £898/$1698. Renewal notices will be sent in the autumn to all current subscribers in the UK and Eire.

Experimental Physiology
The price at which Experimental Physiology will be offered to Members, Affiliates and eligible departments for the 1995 issues has also been held at the 1994 rate of £35 (as compared with the 1995 commercial subscription rate of £145/$272). Renewal notices will be sent to all current subscribers in the autumn. Others wishing to start subscribing should contact the Administration Office.

JOINT MEETINGS IN JAPAN AND KOREA: 1995

More details about the Joint Meetings with the Japanese and the Korean Physiological Societies can now be revealed.

The meeting in Okazaki on 27 and 28 March 1995 will take place at the National Institute of Physiological Sciences. The meeting is subdivided into six one-day symposia so that there will be three parallel sessions. Accommodation in Okazaki can be arranged for about 100 British physiologists which means that, in addition to the 35 invited speakers, there could be 65 participants from The Physiological Society. The cost of accommodation in Okazaki is about ¥ 6000 per night (equivalent to £40 at current exchange rates).

Between the Okazaki and Nagoya symposia the 72nd Annual Meeting of the Physiological Society of Japan will be held at Nagoya University. Members of the Physiological Society are invited to participate in this meeting, presenting their reports in English (although most papers will be presented in Japanese).

In Nagoya on 1 and 2 April 1995 there will be 12 parallel sessions. There is no college accommodation in Nagoya.

OKAZAKI SYMPOSIA
British co-organisers
Comparative Neurophysiology J N Abbott
Ion Channels and the Cardiovascular System J J Gillespie
Epithelial Transport and its Control O H Petersen
Sensory-motor Processing R N Lemon
Neuroendocrine Hypothalamus M L Forsling
Molecular Mechanism of Skeletal Muscle Contraction M Irving

NAGOYA SYMPOSIUM
Integrative Mechanisms in Physiological Function: From Ion Channel to System
British co-organisers
Ion Channels and Sensory Transduction J F Ashmore
Receptor and Intracellular Signalling G L Collingridge
Synaptic Transmission D A Brown
Smooth Muscle T B Bolton
Autonomic Regulation J B B Morrison
Physiology of Pain B Lynn
Respiration J G Widdicombe
Serotonin and Related Monoamines in the CNS and Periphery G Curzon
Trophic Factor, Neural Growth, and Transplantation in CNS S B Dunnett
Vestibular Function G R Barnes
Central Nervous System R N Lemon
Body temperature and Metabolism A S Milton

SEOUL SYMPOSIUM
Membrane Transport and Channels
British co-organiser O H Petersen
The last of the Asian meetings is in Seoul, Korea on 4 and 5 April 1995. The meeting in Seoul will take place at Hanyang University’s College of Medicine. This University has its own hotel and there will be accommodation at a reasonable cost for about 100 British physiologists. As in Okazaki and Nagoya, there will be opportunities for poster presentations. The expenses for the invited speakers will be borne by the Japanese and Korean organisers, whereas the Society’s own support (£25,000) will be made available for younger Members presenting posters. An additional sum of £15,000 has been earmarked for Affiliates and there is a further £10,000 allocated for grants to support attendance at the symposium in Korea.

The Japanese Physiological Society plans to distribute registration forms at the beginning of September. The deadline for grant applications is 14 November 1994 and the deadline for submission of abstracts is 29 December 1994. Those interested in attending the Japanese and/or Korean meetings can obtain registration, application and abstracts forms from the Society’s Administration Office. Arrangements for group travel are being explored and we hope that further details will soon be available. A special newsletter will be circulated with the papers for the Newcastle Meeting.

Ole Petersen

THE BENEVOLENT FUND

Most of the assistance given by the Benevolent Fund in recent years has been to help the spouses or children of physiologists (not only Members of the Society) who die unexpectedly. The trustees have been discussing whether we might broaden the categories of assistance.

Two suggestions have been unanimously supported: firstly, that we should use the Ben Fund to assist physiologists (or their families) who are injured in the course of an attack by animal liberation groups; and, secondly, to offer assistance to retired Members to attend meetings or otherwise to maintain an interest in science. We are dependent on suggestions from Members, as people whom we would wish to support seldom apply themselves.

Please send suggestions to the Trustees either via Heather Dalitz at the Administration Office in Oxford or direct to one of the Trustees (names below, see the Grey Book for addresses and telephone numbers).

Peter McNaughton
Chairman of Trustees of the Benevolent Fund
Physiology Group
Biomedical Sciences Division
King’s College London
Strand
LONDON WC2R 2LS

Trustees of the Benevolent Fund

Prof P A McNaughton
Prof M de Burgh Daly
Prof K M Spyer

Prof R Creese
Prof J G Widdicombe
Dr C A R Boyd

HISTORICAL STUDIES AND ARCHIVES SUB-COMMITTEE

The Sub-Committee has recently defined a changed role and approached the future and this short account is intended to let Members know what we hope to be doing. The Sub-Committee now has a triple role: promoting an interest in all aspects of the history of physiology, managing the Paton Fund for Historical Studies and overseeing the Society’s archival collections.

In relation to the first, the activities of this Sub-Committee and the Historical Studies Special Interest Group are to be closely associated, with a common programme which is aimed at raising an awareness of the historical perspective to physiology at all levels within the Society from senior undergraduates and postgraduates through to established Members. Specific ways in which we intend to do this (not in order of priority) are as follows.

Symposia/Workshops/Demonstrations

The Sub-Committee is considering the organisation of Workshops or Demonstrations, in association with the Scientific Meetings, at which historical material would be presented. The material would be in the form of lectures, displays of equipment and techniques in association with the showing of historical films and video recordings. Demonstrations of classic experiments important in the development of physiology could be mounted.

Paton Lectures on History of Physiology

The Sub-Committee is to sponsor a regular Paton Lecture on a historical aspect of physiology: this will be given in association with a symposium or Special Interest Group meeting closely relevant to the topic concerned. The first lecture will be given by John Severinghaus (San Francisco) on aspects of respiratory physiology at the Aberdeen Meeting in September, in association with the Respiratory Physiology Special Interest Group.

Oral History

Our intention is to establish a systematic oral (and through subsequent transcripts) and written record of contemporary and recent history of physiology. We hope to interview Members, using a taperecorder, about development of their research and teaching, contemporary developments and pressures in physiology and related disciplines. It may be possible to record on video a short section of the interview or develop a series of still photographs for the Photographic Archives. Guidelines for such interviews are being drawn up. Suggestions of possible interviewees and interviewers are welcomed, as are suggestions of interviewers.

Films and Videos

Presently, an attempt is being made to locate copies of films which may be of historical interest to the Society and its Members. A number have been found and copies made. It is intended to deposit and catalogue the material in a suitable place soon. If Members of the Society are aware of old films or early videotapes in
departments which may be of interest they should get in touch with Tilli Tansey, the Honorary Physiological Society Archivist.

**Magazine**

We wish to encourage the submission of short articles/notes/pictures to the *Magazine* on historical topics such as people important to ideas, places, laboratories and ideas, or the development of recording or analysis methods. Several articles have already appeared and the *Traces of the Past* section is already a regular feature of the *Magazine*.

**Preservation**

We have a strong interest in the preservation of all equipment and other material of historical importance and we have a joint working party with the Science Museum which is engaged in cataloguing and preservation. The working party, consisting of Asa Blakeley, Angela Drake-Holland, John Ernsting, Mary Phillips, Alan Sykes and Tilli Tansey, has been established, together with Robert Bud and Simon Chaplin of the Science Museum, to identify, acquire and conserve equipment of historical interest, especially items from the past 30-40 years. Letters have been sent to all Heads of Departments listed in the *Grey Book*, asking for information about suitable equipment for the Society's collection. A labelling system is also being developed, whereby suitable items still in use are tagged and registered for future acquisition. Some materials may be best preserved in the museum or our Archive, though others may best be retained locally in departments.

In this regard, it should be recognised that equipment, notebooks, class notes etc, used in Physiology over the past 20-30 years are important and need preservation.

In pursuing these activities the Sub-Committee is taking the Henry Ford aphorism - “History is bunk” in the same way that students when faced with such an examination question in “General Papers” are expected to react - to argue the opposite! It is our belief that an understanding of the historical content in which present day physiology operates is vital to a true appreciation of the science, adds greatly to our understanding and is enjoyable.

**Paton Fund**

The late W D M Paton donated funds to the Society for the encouragement of the study of physiology: this was matched by the Society to create a Paton Endowment Fund. In making his gift, Professor Paton made suggestions about their use as the extract (below) from one of his letters indicates:

> "On the history of Physiology: I feel the history of actual experiments and scientific ideas needs support - in a direction away from the cult of the individual and quaint anecdote towards trying to map out all the country we've all travelled over".

In meeting these ideas the Sub-Committee are to offer Paton Prize bursaries in the History of Physiology which are intended to encourage the study of the history of the major ideas and concepts which have shaped modern physiology. Details of these bursaries will be made available soon and it is intended that they should be offered regularly.

**Archives**

Through Tilli Tansey (the Honorary Physiological Society Archivist) and Julia Sheppard (Wellcome Archivist), the Sub-Committee will continue to oversee the Society Archives at the Contemporary Medical Archive Centre at the Wellcome Institute for the History of Medicine. The Society’s Archives have been completely removed from Churchill College Cambridge and are on permanent loan to the Contemporary Medical Archives Centre (CMAC) of the Wellcome Institute for the History of Medicine. They have been completely re-boxed and catalogued and are now available for consultation. The collection includes papers and Minute Books relating to the main Committee and its sub-committees, all the Minute Books of the Scientific Meetings and an extensive photographic archive. Small collections of personal papers have been removed from the main Society Archives, but are still available for consultation. To consult the Archives, readers should make an appointment with a member of the CMAC’s staff and sign a reader’s undertaking on their first visit.

**Conclusion**

We welcome comments and ideas for additional activities, particularly suggestions for participation in the Oral History Programme and information about films, videos, equipment and other materials of historical interest. Do get in touch with Tilli Tansey, me or any other member of the Sub-Committee. The current membership is: Cecil Kidd (Chairman), Richard Boyd (ex officio), Reg Chapman, Martin Rosenberg (Honorary Photographic Archivist), Julia Sheppard (Wellcome Archivist), Tilli Tansey (Honorary Physiological Society Archivist) and Brian Whipp.

*Cecil Kidd*

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**AFFILIATION FEES**

Affiliates are reminded that they need to renew their Affiliation now for the forthcoming academic year. The Committee has agreed that there will be no increase in the fees payable (details of which are given on the Affiliation form at the back of this *Magazine*). Please send your remittance to: The Physiological Society (Affiliation), PO Box 506, OXFORD OX1 3XE before the end of September.
**CARDIOVASCULAR/RESPIRATORY CONTROL**

**Future Meeting:**
**Birmingham, December 1994**

A Designated Session will be held at the Birmingham Meeting (19-21 December). Abstracts must be received by the Meetings Secretary by Thursday 29 September. I have been told that this Meeting will be exceptionally large with over ten Designated Sessions, three symposia and a Workshop. Oral communications may have to be limited and therefore I would encourage poster presentations.

I have been convenor of this Special Interest Group for several years. A Business Meeting will be held where members of the group will have an opportunity to select a new convenor. Members are encouraged to contribute to this meeting particularly with respect to ideas for future symposia and workshops. Where would you like the Designated Sessions to be held next year?

Michael P Gilbey

**CELLULAR NEUROPHYSIOLOGY**

**Designated Session at the Cambridge Meeting**

The Special Interest Session at the recent Meeting in Cambridge was enormously successful, despite the travel problems that many delegates may have encountered on that Wednesday morning. The theatre remained full all day and discussion was lively. The posters associated with the Session were presented on the Thursday afternoon and were well attended and received. The group is clearly thriving and has presented a large number of high quality communications and posters in its first three Sessions. I am particularly satisfied with its health and well being and grateful to you as I have had to do very little to see this end achieved. You have yourselves noted when a Special Interest Session will occur and have submitted and marked your abstracts accordingly. The work you have presented has been of such quality and interest that the sessions have been lively and well attended. The group in fact runs itself.

**Future Meeting:**
**Birmingham, December 1994**

The next Session will be at the Birmingham Meeting (19-21 December 1994). This promises to be a large Meeting and we have been warned that the number of Oral Communications may have to be limited. I will ask the Meetings Secretary to give us as long a session as possible, but if you wish to present an Oral Communication, make sure your abstract is in early (submission dates: 19-29 September) and marked clearly. Please remember the Pfizer Prizes and make sure that students whose Communications are eligible are nominated. Nomination forms are available from the Meetings Secretary. Authors whose abstracts arrive after the oral session is filled will be encouraged to present posters. Posters are of course always welcomed in association with a Special Interest Session. If you prefer this mode of presentation please mark your abstracts accordingly.

**Future Meetings: 1995**

Next year’s Meetings programme has now been agreed and I would like to know for which domestic Meetings to propose Cellular Neurophysiology Sessions. If you have a preference, therefore, please let me know. Considering the interest in the Group, it may be appropriate to propose Sessions for all four home Meetings (Keele, Oxford, Cork and King’s College London). I would also welcome any other views you have. There are funds available for running the following rules:

- **Pfizer Prizes**
  - Pfizer has given the Society a one-off payment of £10,000 to fund a number of Pfizer Awards. Awards, with prizes of £150 each, will be made to postgraduate students for oral Communications presented in the Designated Sessions of the Society’s Special Interest Groups, according to the following rules:
  - Up to six Pfizer Prizes will be awarded each year on the basis of oral Communications made in the Designated Sessions of Special Interest Groups.
  - Candidates for a Pfizer Prize should be registered for a higher degree by research in a department of a higher education institute in the UK or Eire. Normally, prizes will be awarded not more than four years from the date of the initial registration.
  - The convenors of Special Interest Groups will be invited to bid for a Prize in one of their Designated Sessions. The Prizes Sub-Committee, in consultation with a representative of Pfizer, will select Designated Sessions in which there will be a Prize competition. Normally, not more than one Prize will be awarded in a particular Session or to one Special Interest Group each year. The list of successful bids will be published in September for the following calendar year.
  - Entrants should identify themselves when they submit their abstracts to the Meetings Secretary. They may submit only one abstract for consideration for a Prize. When the entrant is not the sole author, the supervisor should provide a statement of the relative contributions made by co-authors.
  - Submissions will be judged by a panel of three, consisting of one nominee each of Pfizer Ltd, the Meetings Secretary and the Special Interest Group convenor. Panel members shall not belong to the same department as any of the entrants.
  - The panel shall meet immediately after the completion of the Designated Session and reach a decision at that time. A majority vote by the panel will be sufficient to make an award. An award will not be made if in the opinion of at least two of the panel members it was not justified by the quality of science in the submitted abstracts.
  - The panel will take account of the quality of the abstracts, oral presentations and discussions.
  - The panel decision will be published by the Meetings Secretary as a written notice displayed at the Registration Desk.
  - Awards will be made at a time and place each year to be decided by the Committee Secretary in consultation with a representative of Pfizer Ltd.
COMPARATIVE & INVERTEBRATE NEUROSCIENCE

Designated Session at the Cambridge Meeting

A Designated Session of this Group was held at the Cambridge Meeting. The Poster session was attended by an enthusiastic contingent of comparative neuroscientists. A large range of species (both vertebrate and invertebrate) had been used to examine phenomena ranging from the expression and pharmacology of receptors to the modulation of neuronal activity by monoamines and its functional implications. On Friday morning a brief session of Oral Communications covered polymodal sensory neurones in leech, modulation of muscle activity by neuropeptides in Ascaris and autolytic programmed cell death in Calliphora. Next Designated Session: Birmingham.

Future Meeting: Japan, 1995

The joint Meeting with the Japanese Physiological Society, March 1995, will include a symposium on Comparative Neurophysiology, to be held in Okazaki. Invited speakers will be from Japan and the UK. Free Poster Communications will be welcomed. British Members are strongly encouraged to attend this Meeting, for which funds are available (see Committee News for further details). In particular, we hope that as many young UK physiologists as possible will attend. For further information, contact Dr Joan Abbott, tel (071) 873 2475, fax (071) 873 2286.

Cathy McCrohan

COMPARATIVE PHYSIOLOGY AND COMPARATIVE & INVERTEBRATE NEUROSCIENCE

Future Meeting: Birmingham, December 1994

There will be a joint Designated Session between the Comparative Special Interest Groups, consisting of both Oral and Poster Communications. A Designated Lecture will be given by a comparative physiologist from continental Europe. Members and non-members are encouraged to submit abstracts on any topic. This session follows a very successful joint session held in Southampton last year.

Contributors to this session are eligible to compete for a Pfizer Prize. This is awarded for the best oral presentation by a young physiologist. Further details and application forms are available from us or from the Meetings Secretary. (See previous page for guidelines.)

If you require further information about this Meeting or submission of abstracts, please contact one of us.

Ted Taylor & Cathy McCrohan

HEART & CARDIAC MUSCLE


Recently, I obtained the timetable for the future Meetings of The Physiological Society and it appears that there are no Meetings in 1995 until after the Joint Meeting of the Society with the Japanese Physiological Society in Okazaki on 27-28 March 1995. For this reason, I have arranged the Birmingham Meeting of the Society to be the next Designated Session. Note that this Meeting will be held on 19-21 December (ie not the dates on the original Meetings timetable). The closing date for abstracts is still Thursday 29 September. There will be a number of Designated Sessions at the Birmingham Meeting - in particular, this Meeting will also have a Smooth Muscle Designated Session. Provisionally, I plan to arrange the Heart & Cardiac Muscle Designated Session for the Oxford Meeting in the summer of 1995.

Godfrey Smith

HIGHER SENSORY FUNCTIONS

A Higher Sensory Functions Designated Session was held at the Cambridge Meeting in July. This began with a lecture entitled Merging of the Senses by Professor Barry Stein from the Bowman Gray School of Medicine in Winston-Salem, North Carolina. He described how the responses of neurones in the superior colliculus can be greatly altered when combinations of different sensory cues are present, and showed that these integrative properties depend on the anterior ectosylvian cortex. Barry also provided evidence that the accuracy of localisation behaviour in cats is based on similar principles of multisensory integration. The lecture was followed by 14 Oral Communications, which covered a wide range of topics, mostly within the visual and auditory systems.

In future, the name of this Special Interest Group is to be shortened to “Sensory Functions”. This will ensure that Designated Sessions will attract papers on the physiology of the sense organs as well as processing at more central levels.

The next Designated Session is planned for the Keele Meeting, which takes place from 19 to 21 April 1995. The main Meeting will follow a symposium on 19 April entitled Receptors and Central Processing in Vision Hearing.

Please let me know if you are not yet on the mailing list and wish to be included.

Andy King
HUMAN PHYSIOLOGY

Future Meeting:
Birmingham, December 1994

Once again the Group will hold a symposium and a Designated Session at the Christmas Meeting at Birmingham. The theme of the symposium, to be held on 21 December, is The Limits of Human Endurance and a provisional programme is shown below. The workshop format for the afternoon session is a departure from the traditional lecture session. The workshops will run in parallel. Anyone planning to attend the Meeting who would like to contribute to one of the workshops should contact the chairman of the relevant session (see box) to discuss this.

Part of the Designated Session will be held in conjunction with the Muscle Physiology Group and all relevant papers should be included in this joint session. It is likely that the number of Oral Communications will be limited and authors should be prepared to present in poster format if necessary.

The annual meeting of the Group will take place on the day of the symposium, and any decisions will be made about the topic of symposium for next year's Designated Session. Suggestions for suitable topics are welcome.

Ron Maughan

The Limits of Human Endurance

Wednesday 21 December 1994

Birmingham

10.00-11.00 Across the Antarctic and across the Sahara - a personal experience. MA Stroud
11.00-12.00 Physiological and biochemical limitations to performance. Speaker to be introduced.
12.00-13.30 Lunch
13.30-15.30 Workshops to be arranged and chaired as follows:
   DA Jones Muscle damage and repair
   BJ Whipp Oxygen transport
   C Williams Nutritional and metabolic limitations
   RJ Maughan Central fatigue and brain chemistry
   NC Spurway Genetic endowment vs training adaptation
15.30-16.00 Tea
16.00-16.30 Workshop reports
16.30-17.30 Endurance in perspective. EA Newsholme

MICROVASCULAR & ENDOTHELIAL PHYSIOLOGY

Future Meeting:
Birmingham, December 1994

The next Designated Session is scheduled for the Birmingham Meeting (19-21 December 1994) and coincides with the Smooth Muscle Designated Session.

The Meetings Secretary will do his best to schedule these sessions sequentially rather than in parallel, since many of us may be interested to attend both. As is now customary, a number of Pfizer Prizes will be available for postgraduate students presenting Oral Communications in the Designated Sessions.

An international symposium, entitled Adaptability of Tissue Microcirculation, is also being held in honour of Prof Olga Hudlicka. This symposium will form part of the Society Meeting and is scheduled for 19 December. The following key speakers have agreed to participate:

- EM Kenkin: Role of the Q/PS heterogeneity in controlling capillary transport
- P Gaethgens: Network geometry as a determinant of capillary flow
- BR Duling: Integration of vascular function - reality or desire?
- DW Slaaf: Skeletal muscle microcirculation and low perfusion pressure
- M Gerova: Adaptation of the coronary vascular bed to altered load
- MD Brown: Coronary microcirculation and its relation to cardiac function
- MA Cotter: Microcirculatory changes in experimental diabetes
- G Vrbova: Adaptation of skeletal muscle to altered activity

Further details regarding the symposium are available from Dr S Egginton, Dept of Physiology, University of Birmingham, The Medical School, Vincent Drive, Edgbaston, Birmingham B15 2TT, tel (021) 414 6902, fax (021) 414 6924, Email: s.egginton@bham.ac.uk.

Dr NJ Brown and Dr MWR Reed are organising the meeting of the British Microcirculation Society at the University of Sheffield, 28-29 March 1995. Those who wish to present abstracts at this meeting should contact Dr NJ Brown, tel (0742) 766222, fax (0742) 739903.

Any suggestions for future venues for the Designated Sessions in Microvascular & Endothelial Physiology are welcome. As it was inconvenient to hold a Special Interest Group Business Meeting at the Cambridge Meeting, I propose we hold a discussion meeting in Birmingham.

Giovanni E Mann
Convenor

MUSCLE CONTRACTION

Future Meeting:
Birmingham, December 1994

I was glad to see that the "Muscle Physiology Group" was well represented at the Joint Physiological Society Meeting in Nijmegen. Also, I hope that the contributors to the Oral Communication sessions and the Poster sessions found their deliberations worthwhile and received interesting feedback and constructive suggestions from other participants.
The next Designated Session on Muscle Contraction will be at the Birmingham Meeting on 19-21 December this year. Submission dates for abstracts are 19-29 September. There is considerable interest in making it a joint Designated Session with Human Physiology; however, the details remain to be sorted out. In my opinion, a joint session would be beneficial to both groups. From our point of view, this would encourage participation of researchers on all aspects of muscle physiology, including human physiology, and such a session would provide a wider forum and initiate the much needed interactive discussions between different specialities. I very much hope that the proposed session would be supported by Members and that there would be a sufficient number of abstracts submitted as Oral Communications and Posters to make it a successful session.

**Future Meetings: 1995-1996**

I would also like to propose at this stage that we plan to have Designated Sessions on Muscle Contraction at the Oxford (July 1995) and UCL (April 1996) Meetings of the Society, and would welcome any other suggestions or requests for future sessions of the Group. My address is: Dept of Physiology, School of Medicine, University of Bristol, Bristol BS8 1TD, tel (0272) 303475, fax (0272) 303497.

*K W Ranatunga*

### NEUROENDOCRINOLOGY

**Future Meetings: Birmingham, December 1994 and Japan, 1995**

At the Christmas Meeting of the Society there will be a symposium entitled *Amino acid neurotransmitter regulation of the neuroendocrine hypothalamus* which it is hoped will be of general interest to those working in the neurosciences. The symposium will be chaired by Dr Allan E Herbsion of the Babraham Institute, Cambridge CB2 4AT and the following speakers have agreed to participate:

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>W Wisden (Cambridge)</td>
<td></td>
<td>Molecular biology of excitatory and inhibitory amino acid receptors</td>
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<tr>
<td>C Bourque (Toronto)</td>
<td></td>
<td>Excitatory amino acid regulation of hypothalamic magnocellular neurones</td>
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<tr>
<td>D Voisin (Bordeaux)</td>
<td></td>
<td>The role of GABA in regulating rat magnocellular neurones</td>
</tr>
<tr>
<td>H Jarry (Göttingen)</td>
<td></td>
<td>Inhibitory and excitatory amino acid regulation of gonadotrophin-releasing hormone neurones</td>
</tr>
<tr>
<td>J Bourguignon (Liege)</td>
<td></td>
<td>Developmental aspects of excitatory amino acid regulation of gonadotrophin-releasing hormone neurones</td>
</tr>
</tbody>
</table>

A Neuroendocrinology Designated Session will follow the symposium and papers relating to amino acid regulation of neuroendocrine cells will be particularly welcome.

The Neuroendocrine Group is also involved in arranging a symposium on *The Neuroendocrine Hypothalamus* for the second Joint Meeting with the Japanese Physiological Society. This symposium, which will be held at Okazaki on Saturday and Sunday 1-2 April 1995, is being organised by H Yamashita of the University of Occupational and Environmental Health and me. It is a long way to go, but funds are available from the Society (see Committee News), so do try to attend.

We are always looking for new ideas for meetings and enthusiastic volunteers to help organise them, so please do not be reticent about putting forward your suggestions; we only need a brief outline on which to build.

*Mary Forsling*

### PLACENTAL & PERINATAL PHYSIOLOGY

**Nijmegen Meeting**

This Group had an extremely lively and productive meeting at Nijmegen. We convened on the evening before the Meeting in Cafe Vivaldi, which afforded good views of one of Nijmegen’s famous bridges. The oral session the following day consisted of 12 Communications covering a broad range of foetal and neonatal physiology in various species. The session was very well attended and the small lecture theatre we were allocated certainly provided a most intimate atmosphere. Limitations on time, as well as space, meant that several Communications had to be scheduled as Posters and this session took place at lunch time on Saturday 11 June. Nonetheless, many new links and plans for collaborations were established and Dutch hospitality certainly lived up to our expectations.

**Future Meeting: Birmingham, December 1994**

We plan to hold a Workshop focusing on integrative aspects of the development of cardiorespiratory control at the Birmingham Meeting. Further details will be disseminated soon.

*Mark Hanson*

### RENAL PHYSIOLOGY

**Future Meeting: Birmingham, December 1994**

There will be a meeting of the Renal Physiology Special Interest Group at the Birmingham Meeting of the Society in December. The opening date for receipt of abstracts is 19 September and the closing date 29 September 1994.

*David Potts*

### SMOOTH MUSCLE

**Research Symposium and Designated Session at the Liverpool Meeting**

**Research Symposium**

The research Symposium on *The Cellular Control of Contraction in Cardiac and Vascular Smooth Muscle, Compared* was a joint venture of the Smooth Muscle
and Heart & Cardiac Muscle Special Interest Groups. Our thanks go to Sue Wray and David Eisner for organising an excellent and varied meeting. The symposium opened with talks from Steve Marston (London) and Richard Moss (Wisconsin) who compared and contrasted the mechanisms leading to cross-bridge formation in the contractile apparatus. One of the fundamental differences between cardiac and smooth muscle lies in the relative importance of the myosin light chain kinase on the determination of force. Richard Moss emphasised the role of strong binding cross-bridges in the heart.

The relationship between pH and tension development in heart and smooth muscle were then discussed by Sue Wray (Liverpool) and Richard Vaughan-Jones (Oxford). Sue demonstrated how rapidly pH, followed by a reduction in pH, in small arteries, indicating a high permeability of vascular smooth muscle to protons which is not evident in cardiac muscle. Richard emphasised the importance of the method of inducing acidosis in the heart as Na'/Ca2+ exchange plays a significant role in tension development when an intracellular acidosis is effected through NH4Cl prepulse, but not achieved by NH4Cl prepulse.

Dr Meissner (North Carolina) gave a fascinating exposition of the role of ryanodine receptors in the heart and their interaction with the dihydropyridine receptor (DHPR), and the importance of the 2-3 loop in activity of the DHPR. The fact that receptors from different tissues when transfected into other muscle types were ineffective in activating calcium release was of particular interest.

Professor Andrew Somlyo deviated somewhat from his advertised subject, but the difference between his opinions and those of Kathy Morgan, who followed, on the mechanisms of calcium sensitisation in vascular smooth muscle stimulated some of the most lively discussion of the day. Convincing arguments were provided for the role of arachidonic acid pathways but not PKC(AS), and for PKC(KM). We look forward to the resolution of this dispute! John Solar (Illinois) extended the discussion into the control of calcium sensitivity in the heart. As he emphasised, the term "sensitisation" as applied to the heart belies the considerable underlying complexities of the mechanisms involved. He discussed the important inhibition of contractility induced by phosphorylation of the N-terminal of troponin 1, and co-operation of troponin 1 with troponin C. The interesting possibility that alterations in the myofilament response to calcium could be useful clinically was raised.

The last speaker, David Eisner, discussed membrane and SR calcium removal mechanisms in heart and vascular smooth muscle. His elegant experiments in vascular smooth muscle suggest the SR stores are totally released by caffeine but only partially emptied by noradrenaline. He compared the relatively minor role of Na+/Ca2+ exchange in vascular smooth muscle with a predominant role in the heart.

The closing remarks of the symposium were given by Professor Tomita who, sadly, retires shortly. He thanked the speakers and organisers and invited Members of the Society to the second Joint Meeting of with Japanese Physiological Society to be held in Japan in 1995.

**Designated Smooth Muscle Session**

Designated Posters were given during the symposium and were well attended, no doubt aided by the proximity of a free lunch! There was an oral session the day after the symposium comprising a total of eight presentations, three of which carried on the discussion about the effects of pH on smooth muscle, but also included reports on gastric releasing peptide in the gall bladder and ATP sensitive potassium channels.

**Future Meetings: Birmingham, December 1994 and Japan, 1995**

The next Designated Smooth Muscle Session will be at Birmingham, 19-21 December 1994. There will have been a big gap between this and Liverpool, so let's make it a good meeting. Lots of abstracts, please! The closing date for abstracts (to the Meetings Secretary, not us) is 29 September 1994.

Note that there will be a symposium on smooth muscle as part of the Joint Meeting in Japan in March 1995. This will take the form of several invited lectures, and presentations by poster only.

Lucilla Poston & Jeremy Ward

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**SOMATOSENSORY PHYSIOLOGY**

**Future Meeting: Birmingham, December 1994**

We have a Designated Session at the Birmingham Meeting on 19-21 December. I am pleased to report that Malcolm Roberts, who was the founder-convenor of the Group, has agreed to present a plenary lecture entitled *The anterior pretectal nucleus: a rostral relay for analgesia from dorsal column stimulation?* Malcolm has had a long and distinguished career at the interface of Physiology and Pharmacology. He is currently a reader in the Physiology unit in the recently formed School of Molecular & Medical Bioscience at the University of Wales College of Cardiff. His early work centred on the actions of 5-HT on central neurones but more recently he has concentrated on the brainstem origins of descending control of spinal function and the possible manipulation of these systems for the relief of pain. It is really thanks to the work of Malcolm and his colleagues that the anterior pretectal nucleus is now regarded as an important source of descending control of spinal nociceptive processing.

Please note that the dates for submission of abstracts for this Meeting are Monday 19 to Thursday 29 September 1994. The Meeting is going to huge: there are no less than 11 Special Interest Sessions and the spaces for Oral Communications are likely to be limited. Don't be shy about submitting your abstracts for poster presentation! Hope to see you there.

Rob Clarke
DISCOVERY OF ADRENALINE: THE POLISH CONNECTION

Dear Editor

In the June issue of the Magazine (No 14, pp 10-11), there appeared an interesting article related to the 100th anniversary of the discovery of the physiological function of adrenal medullary extracts. It is worthwhile to remember that a similar finding, parallel to and independent from Oliver and Schaffer's original observation, was made by Władysław Szymonowicz and Napoleon Cybulski in Cracow, Poland. Cybulski was the Chairman of the Department of Physiology at the Medical Faculty, Jagiellonian University in Cracow and Szymonowicz was his young medical assistant. He persuaded to study the overall influence of "suprarenal capsules" on the body—an idea presented by Cybulski in his textbook of physiology published in 1894. Szymonowicz later became a respected Professor of Histology in Cracow.

In 1893, Szymonowicz started experiments on the removal of adrenal glands in dogs and tried to overcome the consequences by injection of adrenal extracts. As a member of the Academy of Arts and Sciences in Cracow, Cybulski presented his results to the Academy on 4 February 1895. These were published (in German) in the same year. The title of the report (English translation) was: "On the effects of the removal of adrenal gland and on the action of the extracts from the adrenal gland". Cybulski reported that extracts of the adrenal medulla increased arterial blood pressure and decreased heart rate in dogs. The last effect was mediated by vagal nerves as it disappeared after bilateral vagotomy. At the next meeting of the Academy on 4 March 1895, Szymonowicz and Cybulski presented data on a pressor substance in venous blood outflowing from adrenal gland. Their findings provided the first evidence that the intact adrenal medulla released unknown pressor substances to systemic circulation.

In "Addendum" to their first full publication entitled "The physiological effects of extracts of the suprarenal capsules" ([Physiol (1895) XVIII: 274-275]), Oliver and Schaffer discussed both common points and main points of the differences between their results and those of their Polish colleagues. Oliver and Schaffer made there an important statement: "...the observations (of Szymonowicz and Cybulski) have been made apparently without knowledge of our work".

Andrzej Trzebski

LEGALISATION OF CANNABIS

Dear Editor

In his obituary in the Annual Report for 1993, the late Professor Sir William Paton is quoted as having been strongly opposed to the legalisation of cannabis and as seeing "the need for reliable pharmacological studies... to ascertain whether or not it was safe". I do not wish to enter the controversy about legalisation for general use, but I am concerned that the Home Office seems reluctant to authorise the use of cannabis even if only for controlled trials of its anecdotal usefulness for palliation in MS, spinal injuries, malignant disease and other painful conditions. Paton's words of caution doubtless are as relevant to the question of restricted use as to that of more general access to the drug. Sir Leslie Turnberg is one of the Society's Members who have publicly voiced their opinions (The Observer, 29 May 1994). I should be grateful to hear from any other readers who share this concern.

Vernon Pickles

VOTING FOR PUBLICATION: CENSORSHIP?

Dear Editor

On 7 July, I gave a Communication, C92, entitled, "A New View of the Cellular Structure of the Mammalian Brain," to the Cambridge Meeting of the Society. Many of the audience did not like my findings or conclusions. While I believe I answered all the points in the discussion, the Communication was turned down for publication by a large majority of the very small proportion of those present who voted.

My colleague, David Jarman, and I also gave a poster, PC4, entitled "Fine Granular Material of the Grey Matter of the Mammalian Central Nervous System." It aroused a great deal of interest and emotion, some of it expressing a reaction or objection to my Communication. Many of the comments were hostile, rather than polite and academic. During the discussion of the approval of posters, a member of the audience expressed disbelief in our findings. This was endorsed by the Chairman, before the vote was taken. I objected to this. The minority of those present who voted did not approve of the poster.

In my opinion, voting to approve or reject publication of an abstract or poster implies:

- that Members can evaluate the evidence and implications in ten minutes
- that The Physiological Society is not expressing a collective view about the validity of the current consensus or a challenge to it
- those who vote are guided by scientific and logical considerations and not consensus emotion or personal interest
- that the validity of findings, conclusions, hypotheses and theories is measured by the number of those who agree with them
- that recommendation for publication should indicate that the abstract or poster is a description of the experiments or observation which were made

Unless all these implications are true, the vote for publication represents a form of censorship. It would be interesting to hear from those who disagree with this. The danger is that any physiologist who comes up with any experiments or ideas which challenge the consensus - as Popper would have us do - will not wish to put them to The Physiological Society, in case they are unpopular or "controversial". This could result in their rejection for publication and permanent damage to the physiologist's career. (I write from personal experience. Is this what the Society wants?)

Harold Hillman
In the April issue of the Magazine there was an account of the mystery object competition held during the Meeting at King's College London. The object was Roy's renal oncometer, now in The Physiological Society Collection at the Science Museum. The latest addition to this collection is a Lucas Pendulum Contact Breaker and it comes from the Department of Physiology at St Thomas's Hospital through the good offices of Mr Peter Skinner, who has long appreciated that the skip is no place for such items, and of Prof Taylor.

**Recording contraction, stimulating muscle**

The use of a pendulum to produce a fast record of the contraction of an isolated muscle was first employed by Fick in the 1870s and some examples of these massive instruments, with a length of nearly two meters, still exist. In the Lucas instrument, the pendulum is not used to measure muscle contractions, but to produce induction shocks of known duration while the resulting muscle twitch is recorded by other means.

With its extended lever arm, the pendulum is brought to its unstable vertical position from which it can be released by an electromagnetic catch. On its descent, it successively opens one contact and closes a second contact. The distance between these contacts, and hence the duration of the stimulus, can be set by the position of the second contact on the divided circle. A locking device secures the pendulum before it can revolve a second time. The moving parts are mounted on a very substantial cast iron base to ensure stability. Shocks of between 0.1 and 120 ms can be produced giving a much wider range of duration than had been obtained with the rheotomes of earlier years.

**Production of the pendulum**

The pendulum was first described by Lucas (1908) and used by him to determine the strength-duration relationships in the excitation of frog muscle. It was manufactured and sold by the Cambridge Instrument Company and appeared in their catalogue of 1913. According to the order books of the Company, which can be seen at the Whipple Museum, Cambridge, this particular instrument (No C158129) was one of three made in March 1931. So, the pendulum was in production for quite a long time.

Lucas had a talent for engineering and he designed a number of instruments which were included in the Cambridge catalogue. He was a director of the Company until his untimely death in a flying accident the beginning of the world to the 1990s! It is hardly surprising that some periods are documented only by Fick in the 1870s and some examples of these massive instruments, with a length of nearly two meters, still exist. In the Lucas instrument, the pendulum is not used to measure muscle contractions, but to produce induction shocks of known duration while the resulting muscle twitch is recorded by other means.

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**Mind your fingers!**

An account of the Lucas pendulum was given by Keynes (1976) at the Centenary Meeting of the Society and Whitteridge (1982) describes its use in Oxford in the 1930s thus: “For the exact timing of two stimuli, Eccles and Sherrington preferred the Keith Lucas pendulum which could deliver two stimuli timed reliably to 0.1 ms for intervals up to 40 ms. A "square" wave from its two stimuli was much squarer than "square" waves delivered by electronic stimulators until the middle 1950s. If the pendulum fell unexpectedly in the dark room, one’s fingers usually suffered.”

This instrument, with its distinguished pedigree, is a valuable addition to the Society Collection but it should not be forgotten that other items with less obvious appeal have played a part in the advance of the subject and are worth preserving. If any such items are languishing in broom cupboards or basements, please think of offering them to the Society.

**Miss K Cann of Cambridge University Library kindly provided much help from the archive of the Cambridge Instrument Company.**

**References**


**The Iconographic Collections Videodisc**

Where can physiologists find portraits and other historical pictures for publication in articles and books and for use in slide presentations and posters? This problem can in some cases be solved with the aid of the Iconographic Collections of the Wellcome Institute Library in London. The Iconographic Collections contain prints, drawings, photographs, paintings and moving films on the history of medicine and related subjects. They can now be accessed through the Iconographic Collections Videodisc, which reproduces over 56,000 still pictures and 35 minutes of moving film from the Collections, and through the associated computer catalogue which is available via JANET and the Internet.

**What's on the Videodisc**

The videodisc includes over 8,000 portraits (prints, drawings, photographs and paintings), among which practitioners of physiology, and of the broader fields out of which it grew (anatomy, natural philosophy and natural history), are well represented. However, given the vast time scale of the subjects covered (from the beginning of the world to the 1990s) it is hardly surprising that some periods are documented only very superficially. Portraits of those who laid down the foundations of physiology, such as Aristotle (BC 384-322) and Galen (129-c 200 AD), and of important later figures such as Jean Fernel (c 1497-1558), Johannes Muller (1801-1858), W B Cannon (1871-1945) and Sir...
John Vane are included, but so are a host of more obscure figures. There are separate sections devoted to the work of two students of locomotion, Eadweard Muybridge and Etienne-Jules Marey (both 1830-1904). There are also many pictures of the activities and institutions which have played a part in the history of physiology, though it is not easy to identify the most relevant pictures a priori because physiology has many branches. It has been in its time a science, a pastime, a form of entertainment for children, a form of religion (revealing the Divine Hand in Creation) and a profession.

As befits a work produced by the Wellcome Institute, the person to whom the greatest number of frames on the videodisc is devoted is Sir Henry Dale, physiologist, pharmacologist and Chairman of the Wellcome Trustees from 1938 to 1960. Portraits of himself and others which he presented to the Library are found with the still pictures, while the films include a ten minute conversation between Dale and Stephen Black about his early career in the Wellcome laboratories and his later involvement in standardising insulin. The moving films on the videodisc also contain a tour of the well equipped laboratories of the Henry Lester Institute of Medical Research in Shanghai in the 1930s.

The fact that the Library holds original works - lithographs, paintings, cinematic films etc - brings two advantages: first, primary sources yield superior quality of reproduction; and second, the copyright problems involved in reproducing from recent publications are often eliminated, since the Wellcome Trust usually holds the copyright and can give permission for publication.

The videodisc is available already at the Wellcome Institute Library in London and at the time of writing is being installed in the Wellcome Units for the History of Medicine at the universities of Oxford, Cambridge, and...
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HENRY BARCROFT, FRS: 90 YEARS

Henry Barcroft will be 90 on 18 October 1994.

In physiology, he is renowned for establishing a school of research into the nervous and chemical control of the circulation in human limbs, using venous occlusion plethysmography to measure blood flow. This brought him international recognition and laid the foundation for much that followed.

The clarity, accuracy and directness of his mind and writing, the elegant simplicity of his slides and illustrations, the ability to formulate important questions and to answer them with immaculate experiments, and his scientific integrity have always commanded admiration and given pleasure. His interest in other people's work, especially that of the young, earned the affection, respect and gratitude of those who worked with him, were encouraged by him or just knew him. In 50 years I never heard Henry say an unkind word about others or heard others say an unkind word about him.

At the celebration of his 80th birthday, R F Whelan, who had been his student at Queen’s, and his research fellow at St Thomas’s, said “Henry evoked high standards from his juniors and his colleagues, but in the kindliest way. He would apologetically declare that he does not quite understand your explanation of a set of experiments. You explain again, but Henry claims not to understand. So you explain a third time, but now it begins to dawn that you don’t really understand it yourself! But all the time Henry gives the impression that the fault is his. One strives all the harder to save him embarrassment!”

From undergraduate to lecturer

The Barcrofts were a distinguished Anglo-Irish family, based in Newry, County Down. Henry’s father, Sir Joseph, famous for his work on respiration and foetal physiology, was Professor of Physiology at Cambridge. Henry went from Marlborough to King’s College, Cambridge, with an Exhibition, and was placed in the First Class in Part 1 and Part 2 of the Natural Sciences Tripos. He gained studentships which enabled him to spend two years researching in Cambridge before proceeding to St Mary’s Hospital Medical School with a Harmsworth Scholarship to undertake clinical studies for his medical qualification. This completed, he was appointed as a lecturer in Physiology at University College, London (in 1932).

Perhaps he felt the influence of Sir Thomas Lewis, founder of Heart, later re-named Clinical Science. Next year he married Dr Bridget (Biddy) Ramsay, sister of the future Archbishop of Canterbury. They were parted only when she died in 1990.

Aged 30: the Dunville Chair of Physiology

In 1935 the Dunville Chair of Physiology in the Queen’s University of Belfast became vacant. The University was anxious to promote active research in the Faculty of Medicine. They chose Henry, then aged 30. It was a brilliant and most successful appointment.

In the next 13 years, Henry brought Queen’s international renown for research into the circulation in human limbs. His choice of research was most appropriate. There was the opportunity - and often the necessity - to collaborate with and involve clinical colleagues. The budgetary needs were modest at a time when Queen’s was far from affluent. But all was not easy. The teaching load was heavy and practical classes had to be triplicated. Not until 1938 was a lectureship in Physiology established, O G Edholm being the first holder. Travel to meetings in Britain required determination and stamina, especially in the war years. But Henry was very successful in attracting good graduates to his short term demonstrator posts with opportunity to work for an MD by thesis or for a Primary Fellowship in Surgery. All lectures were at 9 am, leaving the rest of the day potentially free for research. Thus (with Edholm and others), he was able with to investigate the constrictor and dilator innervation of muscle blood vessels and the effects of adrenaline, sympathectomy and exercise on the muscle circulation. Among other work, they analysed the circulatory changes in haemorrhage. Working at St Mary’s, London, I was greatly attracted, and looked forward to hearing and seeing Henry at Meetings of the Society.

From Belfast to London

In 1948 Henry was appointed to the Chair in the Sherrington School of Physiology at St Thomas’s Hospital Medical School. He and Biddy left a host of friends in Belfast, and their lovely house in Wood Lane, Highgate, became the site of their warm and generous hospitality. Henry quickly established his research, with new collaborators. He was the author, with HJCSwan, of the first of the Monographs of The Physiological Society: Sympathetic Control of Human Blood Vessels, published in 1953. It set a very high standard for clarity and readability. It was so successful that Henry was asked to chair the Editorial Board of Monographs for eight years, during which time 11 volumes were published.

Honours have come plentifully. He was elected FRS in 1953 and FRCP in 1959. He holds honorary doctorates from three universities. He has given eponymous lectures to the Royal Colleges of Physicians and Surgeons and a Bayliss Starling Prize Lecture to the Society. He is an honorary member of the French and Japanese Societies of Angiology, the Czecho-Slovak Medical Society and of our own Society. Appointment as a Wellcome Trustee from 1966 to 1975 gave him much pleasure and the opportunity to meet old and new friends in distant places. Though not an animal physiologist, he has served as Chairman, Secretary and Vice President of the Research Defence Society.

Henry’s formidable memory, accuracy and determination continue. A former yachtsman, he has recently joined with OL Wade in tracking down the life and contributions of Admiral Sir Francis Beaufort FRS, navigator, surveyor and originator of the Beaufort windscale. The results have, of course, been published.

We look forward to his next publication!

David Greenfield
OLD AGE, LESS STRENGTH

This brief statement is based on a review given at the Society’s Human Physiology research symposium on “The Physiological Consequences of Ageing in Adults” in December 1993.

There will be 5 million people aged 70 by the year 2001 in Britain. It is important that they retain the physical capability for an independent lifestyle for as long as possible. The prevalence of muscle weakness and the reasons for loss of muscle strength in old age are therefore of interest. There is some irreversible loss, which may have a genetically programmed basis, and some potentially reversible loss, which is attributed to low levels of physical activity.

Strength and Muscle Mass

Most studies, including recent large random surveys of adults in this country, show that, although strength is well maintained into middle life, it decreases later with an accelerating time course in both men and women (Fig. 1), and that women fall to very low levels (Bassey & Harries, 1993). This is so on average but there is much variation. Decreases in physical activity with age were found in both surveys and, in the older groups, the decrease in strength was significantly associated, independently of deteriorating health, with a decrease in reported use of the relevant muscles. Those whose activity levels do not change show little or no longitudinal decrease in strength, sometimes over many years.

There is also, on average, a decrease with age in muscle mass, which is fairly consistent with the fall in strength, despite the accumulation of internal fat in the muscle (Forsberg et al, 1991); 80 year old men and women have only half the mass of those aged 25 years. This loss is not accounted for by the 25% decrease in mean cross sectional area of the muscle fibres, so there must be a decrease in the numbers of fibres (Sjostrom et al, 1992). Death of their motor neurones leads to death of the muscle fibres unless they elicit new axonal sprouts from neighbouring neurones. The extent of reinnervation is greater than previously assumed but no good evidence for hyperplasia has emerged.

Old Muscle

Old muscle therefore contains large motor units which are mainly of the slow, low threshold type in a clumped pattern of fibre type distribution. If function was to be preserved this loss of motor units would have to be offset by increasing hypertrophy of the remaining fibres. This may occur in people who choose to remain active throughout their later life, showing only modest decrease in physical performance, and illustrating a minimal inevitable loss. They are selected, but they become indistinguishable from their sedentary peers as soon as their activity levels drop.

The drop in cross sectional area of muscle fibres affects the fast fibres much more than the slow, resulting in a muscle with slower performance characteristics. Explosive power decreases with age much more than isometric strength, and older compared to younger groups show greater loss of force at higher speeds of movement. The cause of this selective shrinkage of the faster fibres is likely to be avoidance of the high intensity exercise in which they would be recruited.

There may also be qualitative changes within the muscle fibres. Myosin isoforms, which are associated with slower contractile properties, appear to be more prevalent in muscles from older individuals. This would allow a lower neuronal discharge rate to produce a fused tetanus in the older muscles. These changes may also be due to changing patterns of use; there is no evidence for a change in the intrinsic contractile mechanism.

Plasticity in Old Muscle

Muscle fibres retain plasticity throughout adult life. They remain capable of expressing a variety of isoforms of myosin and so can mount an anabolic response in which they adapt specifically to the demands of the exercise (low intensity aerobic or high intensity anaerobic). Old muscle can increase in strength as much as young muscle (by 11%) and greatly increased strength (doubled in eight weeks) can be elicited safely with conventional training programmes (Fiatarone, 1990). This is cogent evidence for the role of reversible disuse atrophy in the muscle weakness of healthy old age.

Recent controlled trials using oestrogen or growth hormone have shown no effect of these hormones on strength. Nutritional requirements for anabolic responses, however, are greater in old people compared to young.
In summary, there is evidence for an accelerating loss of muscle strength with age in late adult life, due in varying parts to irreversible loss of motor units and potentially reversible disuse atrophy of muscle fibres.

Joan Bassey

Some of this work was funded by the Nuffield Foundation, the Grand Charity, the Sports Council, the Health Education Council and the Wellcome Trust.

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THE STRENGTHENING HORMONE

Hormones affect muscles in various ways: for example, anabolic steroids make muscles hypertrophy and adrenaline increases muscle glucose uptake. However, we consider that our recent discoveries about the action of oestrogen provide the first example of a hormone altering the behaviour of the muscle crossbridge.

Weakness of Old Age

Our work started as an investigation of the weakness of old age. It is well known that this is at least partly due to loss of muscle bulk, in turn due largely to loss of motor units. However, it had been controversial whether the remaining muscle is able to produce as much force as would be expected from its residual bulk. We investigated this question in the adductor pollicis muscle on which we can make simple measurements of cross sectional area and compare them with maximum voluntary force. We found that the ratio of force to area in subjects over 76 was about 25% less than in those aged 20-45, even though the weak subjects were able to activate all of the muscle. Thus, the weakness was due in part to specific muscle changes and not all due to atrophy. In both these age groups, men and women had the same force/area relation, but the time course of the decline was quite different in the two sexes.

Decline of Muscle Strength: the Sex Factor

In men there was a gradual decline from about age 60, but in the women there was a sudden decline at around the time of the menopause without further change thereafter. Thus, the declines in muscle strength resemble those in the levels of sex hormones. In this study of the time course of this decline, we had excluded women who took hormone replacement therapy (HRT). However, when we compared a group of women taking HRT with non-users matched for age and the time after their menopause, we found the force relative to their muscle area was clearly greater in those on HRT than the non-users and, indeed, not significantly below that of premenopausal women.

But what about old men? Would treatment with oestrogen or with testosterone (which converts to oestrogen in the tissues) increase their strength? We don't yet know and there are ethical problems in treating elderly men with either steroid. (Testosterone might cause prostate cancer to advance and oestrogens, when they were used in the treatment of this disease, caused strokes as well as feminisation).

Oestrogen or Progesterone?

Most HRT users in the UK take both oestrogen and progesterone. Which is the strengthening effect due to? We have obtained the answer in an indirect but rather interesting way by investigating muscle function during the menstrual cycle. Oestrogen rises to a peak at the time of ovulation, about day 15, and then falls again, whereas progesterone is low until ovulation then rises steadily during the second half of the cycle. If the “strengthening hormone” acts within a day or two we should expect one or other of these patterns to be reflected by force measurements during the menstrual cycle. A pilot experiment, conducted as a student project, compared each subject on or near days 1, 14 and 21 of the cycle. The force was significantly greater at day 14 than either of the other days. A more detailed study, not yet published, shows that there is a sudden drop in muscle strength at around the time of ovulation, taking the force from its highest point within the cycle to its lowest point within as little as one day. We conclude that oestrogen not progesterone strengthens muscle and that its action is quick.

Oestrogen and Crossbridges

How does oestrogen have this effect? It could act by reducing the number of crossbridges that are able to produce force. We have shown that this is not the case by stretching the active muscle suddenly. If the crossbridges are attached they will resist stretch and more force will be produced. This turned out to be true in menopausal women and in aged mice. Thus, the cross bridges are attached, but are not pulling as hard as usual. This situation also occurs in fatigue in which intracellular inorganic phosphate is increased. This inhibits the transition of an attached crossbridge to the state in which it can exert most force. Thus, we postulated that oestrogen could act via an increase in inorganic phosphate; but we were wrong. Using NMR we were able to show that weak old mouse muscles do not have a raised inorganic phosphate, nor a lowered pH, which would have been another possibility.

To summarise, we have found that oestrogen acts on human muscle causing it to produce an increased force. This action is remarkably rapid and works via
a change in the kinetics of the crossbridge reactions themselves. The nature of the link between the oestrogen and the crossbridge will be a subject of our future research as will the implications of these discoveries for athletes and for the treatment of the elderly and of other groups in which oestrogen is low.

Roger Woledge, Suzanne Philips & Stuart Bruce

Roger Woledge is outgoing Head of Physiology at UCL and from October 1994 he will be director of a new Institute of Human Performance, part of UCL at the Royal National Orthopaedic Hospital, Stanmore. Suzanne Philips is Senior Research Fellow at UCL and will also be moving to Stanmore. Stuart Bruce is Consultant Geriatrician in Hastings and Honorary Senior Clinical Lecturer in the new institute.

The work was supported by Action Research, Research into Ageing and South East Thames Regional Health Authority.

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BREATHING INTO OLD AGE

The pulmonary system operates less effectively in the elderly. This can have a significant impact on daily activities, as the combination of the compromised ventilatory capacity and increased ventilatory requirements often leads to “shortness of breath” (or dyspnoea) and reduced “exercise tolerance”. What, therefore, are the mechanisms that cause the reduced ventilatory capacity and the need for increased ventilation in the elderly?

Impaired Ventilatory Capacity

There are several factors that underlie the seemingly inexorable deterioration of respiratory-mechanical function associated with ageing.

Rib cage

The chest wall undergoes a progressive reduction in distensibility or “compliance”, as bone and cartilage become less resilient and joints become prone to calcification and ankylosis. Kyphosis of the spine (or “dowager’s hump”) and a barrel shaped chest can further compound the problems of thoracic malfunction.

Lung recoil

Deterioration of alveolar tissue leads to a reduced ability of the lungs to recoil. Lung emptying also becomes compromised because of increased airways resistance - and even collapse - of the small airways lacking cartilaginous support. This is because of the reduced traction of the surrounding parenchyma. Consequently, cardinal indices of pulmonary-dynamic function - the “forced expiratory volume in one second” (FEV1) and the “maximum voluntary ventilation” - decline progressively with age. This decline is more rapid than other important functions such as cardiac output and maximal oxygen uptake.

When breathing becomes forceful (eg during exercise), “expiratory flow limitation” can result. That is, further increases in expiratory effort do not lead to further increases in expiratory flow, at a given lung volume. There is also an inexorable decline in the “vital capacity”, reflecting the increase in residual volume - a result of the alterations in lung and chest wall compliance, air trapping behind collapsed airways and (in some instances) expiratory muscle weakness. However, as the decreased lung recoil is essentially offset by the decreased chest-wall compliance, total lung capacity is not greatly affected.

Respiratory muscles

The respiratory muscles certainly do not suffer from the ongoing decline in habitual activity that is typical for limb muscles (and possibly also the accessory muscles of respiration). However, the altered chest wall conformation causes a reduction in the resting length of the inspiratory muscles. This reduces their mechanical advantage by constraining them to operate over a less advantageous region of the “length-tension” curve. This effect is often compounded by loss of tone and weakening of the abdominal muscles, causing the diaphragm to become flatter when relaxed.

Increased Ventilatory Requirement

It proves useful to consider the ventilatory (VE) requirement within the context of: the demand for pulmonary CO2 clearance (VCO2), the “set point” at which arterial PCO2 (Paco2) is regulated, and the “ventilatory efficiency” (or physiological dead space to tidal volume ratio, Vd/Vt):

\[ \text{VE} = \frac{V_{CO2}}{P\text{aco2} (1 - V_d/V_t)} \]

The deterioration of lung structure that occurs with ageing leads to impaired pulmonary gas exchange. This is manifest as a progressive widening of the “alveolar to arterial Po2 difference” and progressive arterial hypoxaemia (arterial Po2 declines by -0.5 kPa per decade, on average). This can be attributed to factors such as

- a less uniform distribution of inspired gas, owing to regional differences in lung compliance and small-airways resistance
Limited Exercise Tolerance

As the increased ventilation required for a given physical task in the elderly occurs within the constraints of a diminished ventilatory capacity, the range of achievable ventilations during exercise therefore becomes limited. This in turn may also exacerbate dyspnœic sensations, leading to a consequent reduction in daily physical activity and further reduction of exercise tolerance. The repercussions for physical health and psychosocial well being are all too clear.

A small but growing segment of the elderly population continue to pursue competitive athletic activities at a high level. Such “masters athletes”, because of their high level of fitness, generate ventilatory requirements at maximal exercise that encroach on or even exceed their ventilatory capacity and are therefore clearly “ventilatory limited”. What is less clear, however, is whether the prolonged period of physical activity in any way confers a protective influence on the otherwise inexorable decline of pulmonary function with advancing years.

Pulmonary function in the elderly, however, may be compromised not simply because of ageing per se, but because of the development of pulmonary disease consequent to exogenous influences such as pollutants and industrial exposures, tobacco smoking and also weakened immunological defence mechanisms. As the normal human time span makes the conduct of longitudinal studies of human ageing difficult, much of the available data has been obtained from cross sectional studies, for which the degree of variability within a given age band is likely to be high. These limitations should be borne in mind when attempting to characterise the time course, scope and impact of the ageing of the human pulmonary system.

One hopes that the future will provide innovative strategies to halt or even reverse - the structural changes in the pulmonary apparatus that lead to its currently relentless functional deterioration with advancing years.

Susan A Ward

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SECRETION ACCRETION: LOOKING AT EXOCYTOSIS

Obtaining functional information from ultrastructural studies has always been a difficult task, especially when studying rapid processes such as neurotransmission or secretion. In most cases chemical fixatives, such as glutaraldehyde, are not effective for investigating the different stages in such processes or for quantifying the response to a particular electrical or chemical stimulus. Physical fixation, using ultra-rapid freezing at rates of between 10^4 to 10^6°C per sec, has been a great asset in this type of study, allowing even very rapid events such as the exocytosis of synaptic vesicles to be captured. Unfortunately, ultra-rapid freezing also has its limitations. Apart from involving elaborate and sometimes expensive preparative stages, only a superficial zone near the surface of a tissue can be adequately fixed. Also, because the specimen is being “sampled” over a very short time interval, it is difficult to obtain images of many events, particularly if they occur infrequently.

Tannic Acid Arrests Exocytosis

At the National Heart and Lung Institute, I have been using a different approach - one involving “physiological arrest” procedures - to investigate the functional morphology of both secretion and neurotransmission. The principle of this approach was discovered by Buma and colleagues, while studying neurosecretory release. When secretory granules fuse with the plasma membrane they form “omega profiles”, named after the characteristic membrane configuration. When tannic acid was used in conjunction with glutaraldehyde, as a primary-fixative cocktail, the number of omega profiles they obtained was greater than when glutaraldehyde was used alone. By incubating in tannic acid, prior to glutaraldehyde fixation, they found a further large increase in the number of omega profiles. I have used tannic acid in a similar fashion, to investigate the release of atrial natriuretic peptide (ANP), a cardio-hormone, from the atria of the rat heart.

In hearts prepared with a glutaraldehyde-only primary fixation, it is difficult to find evidence for exocytotic release of ANP. However, after an initial tannic acid perfusion step, omega profiles are plentiful (Fig 1 and back cover) and the number increases with the length of perfusion. The number of fusion sites can also be altered by other factors, such as the degree of atrial distension, known to affect ANP release. Tannic acid, a long-chained plant polymer, has protein, lipid and carbohydrate-fixing capabilities but is not thought to enter intact cells. The implication is that tannic acid acts at the cell surface to arrest secretory granule exocytosis, while allowing continued secretion. Cell structure is affected but a degree of integrity concomitant with release is maintained, at least over the 30 minute perfusion period used.

Tannic Acid and Other Polymers Interact with the Glycocalyx

Close examination of omega profiles shows that the glycocalyx - the cell coat formed from the carbohydrate portion of integral membrane glycoproteins and glycolipids, and the externally located glycosaminoglycans (mucopolysaccharides and proteoglycans) - is well retained over the fusion pore (arrowed, Fig 1). Thus, a possible mechanism for the arrest process is that tannic acid somehow holds the glycocalyx together preventing secretion and retaining the initial omega profile (Fig 2). Further evidence is provided by the observation that tannic acid is not alone in producing this “arrest” phenomenon. When the rat heart is perfused with dextran, another long-chained polymer but one without a conventional fixative action, large numbers of omega profiles are also found (Fig 3), and again the glycocalyx is well retained. It is possible that both polymers act in a similar manner, by interacting with the glycocalyx and preventing its deformation after fusion. This could then trap the secretory product and prevent incorporation of the granule membrane. Ficoll, another polymer known to affect release processes, may also have a similar action.
Secretory granule exocytosis arrested by 15% dextran (Sigma; MW, 11,000; pH 7.4). Coated pits (example arrowed) form on the granule membrane at the sites of fusion, and are also arrested. Bar, 100 nm.

Even a process as rapid as synaptic vesicle exocytosis can be arrested using this approach, producing startling images of vesicle fusion (Fig 4). As with hormone release, large numbers of events can be obtained as they "accrete" over the incubation or perfusion time.

I have also found that coated pits will form on "arrested" granule membranes (arrowed, Fig 3), probably in an attempt to recycle components of the membrane involved in the fusion process. The incidence of coated pit formation increases with perfusion time, indicating that endocytosis as well as exocytosis is being arrested. It appears then that these "physiological arrest" procedures may be used to investigate a variety of plasma membrane activities. By using different cell surface-acting agents, it may be possible to target specific processes, with minimal disruption of the rest of the cell.

This work was supported by the British Heart Foundation.

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Dr Fred Imms of UMDS expressed his opposition to the demise of the traditional practical class in a piece in the July issue of the Magazine. I too feel that experimental work is an important part of modern Physiology, but at King's College London we have rethought the role of the traditional practical and have come to the conclusion that in some ways it fails to meet the educational needs of students of Physiology.

Pros and Cons of Traditional Practical Classes

On the positive side, traditional practical classes introduce students to a range of techniques and allow them to see in front of them the phenomena they are told about in lectures. On the debit side, practicals are expensive to run and the poor standard of apparatus in most university lab classes means that students can only see the results of experiments first performed 30, 50, or even more years ago. For instance, intracellular recording of the action potential, which is taught in lectures, is impractical to carry out in elementary classes and students can only see the much harder to understand extracellular recording.

I have several further criticisms of traditional practicals. They are essentially cook-book. Students know the result they are expected to get and are satisfied with some sort of approximation to it. There is no element of proving a result - of trying it sufficient times to be sure that it is really correct and not just a one-off. Worst of all, in my view, there is no element of curiosity. Students are told what to do and what to expect. By the second year their enthusiasm is dimmed and those who turn up spend the minimum time in practical classes necessary to gain the information they will need to pass the exam. Surely this is not the
purpose of such a hugely expensive teaching operation - one whose cost far outweighs the cost of giving lectures or tutorials.

Introducing Projects

With these considerations in mind we have introduced project based practical classes for first year medical and dental students and for second year science students at King's. Every student therefore spends about half of their total lab time doing project work. Students initially spend a week or two being introduced to the apparatus available and to the type of experiments possible. During this time they decide on a project to carry out in the coming weeks. It is important to emphasise that the students think up their own projects, in much the same way as a practising scientist must decide what area to study next in an original experimental programme. Students are not presented with lists of projects from which they can choose.

Some of the proposed projects are bizarre and unfeasible, but almost all are interesting. One group approached me for approval of a project investigating the effects of alcohol and marijuana on cardiac output. The first part was approved and carried out; the second part I agreed was interesting and worth doing, but for legal reasons I regretted that I could not approve it. Other successful projects included the effects of a strenuous training programme, carried out over several weeks by an unfit but enthusiastic dental student, on cardiac output in response to exercise (answer: striking; differences in respiratory function between control subjects and trained musicians (answer: none detectable); and effects of hyper and hypotonic solutions on the nerve action potential (complicated). It is essential that students should receive guidance in selecting and carrying out their projects and for this reason we have synchronised lab and tutorial groups so that a single staff member is responsible for both the tutorial and lab work of each practical class group.

What does a Student Learn?

Repeating experiments and gaining an idea of statistical variability is an important element of project based classes. Another important element is the use of computer word processing, spreadsheet and graphics packages to analyse and present data. Students receive three training sessions in the use of these packages. A final and vital element is the presentation to their colleagues and to staff. Each group presents their results as a ten minute Phys Soc style Oral Communication. They are marked on content and style of presentation by both staff and fellow students. The marks are used for in-course assessment - including those given by fellow students.

The principal objective of the project based classes is to introduce students to real science. From the above it can be seen that all the elements of the life of a practising experimental scientist are present in miniature - thinking of a hypothesis, carrying out experiments in a small team, replicating results, analysing and graphing results using computer based methods, presenting to colleagues and submitting results for review by peers.

Does it Work?

The system has now been running for two full years and we have had a good opportunity to assess the outcome. Enthusiasm is a major plus: students are often in the lab analysing results out of normal hours, although for safety reasons we cannot permit them to carry out experiments. The customary drop-off in attendance as the term wears on is a thing of the past. A second less quantifiable positive feature is that students learn about how real science is carried out and how to work in teams towards a common goal. A third undoubted gain has been our ability to provide sophisticated equipment. A single item can be purchased for the use of one project group throughout the term, whereas purchasing ten of the same item for the use of the whole class for one or two weeks would be unthinkable.

There is, of course, a downside. Students come in contact with a much more limited range of experimental methods. They hear about the use of other methods during the presentations, but that is of course much more indirect. A second problem has been the enthusiasm generated by the projects. Staff find that lab classes go beyond their allotted time and that students come to discuss their projects outside the normal tutorial slots. On balance, though, the vast majority of staff are convinced that the change has been for the better and amongst them are several who were opposed to the idea at the outset.

Peter McNaughton,
King's College, London
JOIN THE INFORMATION REVOLUTION - USE EMAIL!

Since I first wrote in the Magazine about electronic mail or Email three years ago, little seemed to change until recently. But now the Internet, the Information Superhighway and Cyberspace have become the height of fashion, and even senior Members of The Physiological Society are joining The Net.

For the few who still don’t know, Email is a computer-to-computer system to enable people to communicate with each other internationally, nationally and locally, via one or more computer networks. You need access to a suitable terminal (often a lab PC or open access machine in the university connected by the local network to the central mailserver computer) and you need your own mailbox registered with your computer centre. Your mailbox plus the computer’s address on the network is your personal Email address. Mine is given at the end of this article.

The Benefits of Email

Email has several advantages over other tele-communication techniques, but perhaps the greatest for UK academics is that it is free! It is often as fast as a fax, easier to send and more secure, since you need a password to read it. But you can only send messages or files you have entered into a computer. Speed of response depends on the recipients reading their Email reasonably often, but most users with an active correspondence look once or twice a day. It is surely the most efficient way of communicating with places like Australia or California which have few or no working hours overlap with the UK. The message can easily be saved by the recipient and loaded as a file into a word processor, without needing to be retyped. So it’s an ideal way for joint authors to communicate as they prepare a paper. Email is also an excellent pathway to greater computer literacy and all the benefits that follow connection to the network, including direct access to bulletin boards (even The Physiological Society has an experimental one at UMDS), Medline, the Science Citation Index and the World Wide Web. This last is an initiative started at CERN, and will supposedly be “the universe of network-accessible information, an embodiment of human knowledge”. What has this to do with nuclear physics?

Coming back to earth, what seems to be a less known asset of Email is that you can read it from any computer connected to the Internet (the international network of national networks), wherever it may be. Thus I have read my Email while visiting colleagues in, for example, Boston, New Orleans, San Luis Obispo and Kaiserslautern. Admittedly the link was often slow, but it allowed me to ensure my Email correspondents did not realise I was away! Once my host had connected to Telnet or Internet, all I did was request connection to mail.bristol.ac.uk and then when prompted enter my logon and password. And soon, often to my host’s surprise, the screen displayed exactly the same menu as it does in Bristol. You can also read Email via a modem and telephone line, but that is more expensive.

There are a few disadvantages to Email. You need minimal keyboard skills - but are also motivated to improve them. It takes a few seconds to set up the terminal so you can read your mail - but it takes time to open envelopes too. Printing out a copy requires some additional skills and your own paper is consumed. Messages sometimes get lost in cyberspace and you cannot know they have arrived until you get a response.

Survey of Grey Book Email Listings

Until recently Email users were quite rare but they are now multiplying fast. In the current Grey Book directory of Members of The Physiological Society, only 7% of Ordinary Members give an Email address, although 14% of Foreign Members list one. I recently tried to assess how much use was made of Email by a sample of the Ordinaries who gave their Email addresses. Rather typically, 12 of the 31 messages I sent were rejected by the network, probably because the addresses were inaccurate or out of date. But 15 of the remaining 19 evoked rapid and enthusiastic replies. (I had asked them what they thought of Email and whether they thought the society might set up a newsgroup.) Perhaps the remaining four read their mail only rarely, or saw no point in answering me. These proportions were not unexpected, but what did surprise me was the result of a quick telephone survey of Members on page 118 who did not give an Email address. All six I successfully contacted told me they had recently started or were about to start using Email! Indeed, two people I had contacted only via their answering machines actually Emailled me back! Probably the greatest handicap to the rapid growth of Email use by physiologists is the difficulty of finding Email addresses of people you rarely communicate with. Journals seldom publish Email addresses of authors and directories are rare and usually out of date. Even when you get an address from someone in person, it often does not work without minor changes. Some places do already have good electronic directories accessible via the Internet, the Universities of Utah and Oxford, for example, but most don’t. Anyhow, reaching them is hard for the novice Emailer! An up to date Grey Book will be a great help, if only people will include their Email addresses. Maybe the Administration Office will soon be able to Email people a file of Email addresses...

Meanwhile the Meetings Secretary has long had an Email address under his own name in the Grey Book, and even reads his mail; the Committee Secretary has recently started to read his and Heather Dalitz is starting to read hers. But neither the Treasurer nor, indeed, the Editor of this very Magazine, seem to be connected yet. Surely they cannot hold out much longer!

Roger.Thomas@bristol.ac.uk

1 j.i.gillespie@newcastle.ac.uk
2 carboyd@vax.oxford.ac.uk
3 hkdalitz@vax.oxford.ac.uk
AFFILIATE JOINS THE MAGAZINE EDITORIAL GROUP

Following her request for volunteers for an Affiliate to represent younger physiologists on the Magazine Editorial Group, the Editor received several enquiries and asked all candidates to write a specimen article together with suggestions for future Magazine items. As a result of this competition, Valerie Cox has been selected as the Affiliate to join the Magazine Editorial Group. If you would like to contribute something to the Magazine, have some interesting news to report or can identify some subject matter which could usefully be included in the Young Physiologists section, please contact Valerie at Muscle Research, Level 11, Worsley Building, University of Leeds, Leeds LS2 9JT, tel (0532) 335893, fax (0532) 334803.

A DAY AT BRISTOL: SPINAL CORD SYMPOSIUM REPORT

The Spinal Cord Symposium, Bristol's sixth symposium for young physiologists, was held on Monday 23 May 1994. It was attended by about 85 participants from around the country and the programme included eight talks and seven poster presentations, all given by young physiologists.

The day commenced with coffee and an opportunity for people to meet each other. After a brief welcome and introduction, the morning session began. This consisted of talks on descending control, discussing the role of supraspinal sites - for example the pretectal nucleus and the diversity of tryptaminergic pathways from these sites. The third speaker was the most travelled of all, from Kiel, Germany. He talked of pathological communications between sympathetic and afferent neurones within dorsal root ganglia after nerve injury and their possible role in producing pain states.

Lunch consisted of a superb buffet and a number of posters. These covered a mixture of topics, including the role of nitric oxide in nociception, computer analysis of EMG responses elicited by motoneurones and the role of transglutaminase in neurone disease. The first afternoon session was concerned with motoneurones, as interneurones in fictive locomotion, as transplant material into the rat spinal cord, and as major components in a simple spinal cord. A welcomed tea break gave a good opportunity to discuss some of these ideas further.

Spinal sensory processing was the topic to round off the day. Changes are known to occur centrally and in the periphery following inflammation, both chemical and electrical. These were described by the final speakers and met by extensive discussion, especially from young physiologists! The symposium ended with a lively meal, held in a local bistro. All in all, a very enjoyable day.

We would like to thank The Physiological Society and the Department for their support. We are eagerly awaiting the seventh Young Physiologists symposium.

Caroline Scott
Philippa Hudson
University of Bristol

University Laboratory of Physiology, Oxford
(an equal opportunity employer)

POSTDOCTORAL RESEARCH NEUROPHYSIOLOGIST

Academic-Related Research Staff Grade 1A
Salary Range: £13,601–£18,035

A four year postdoctoral position is available from 1 January 1995 funded by the Wellcome Trust to study the cerebellum in visually guided movement. The work will involve single unit recording, reversible inactivation techniques and movement analysis. Experience of electrophysiological recording in mammals and some computing skills would be useful. The candidate will join a small but well funded team; other work in the group consists of human and clinical motor studies and computer modelling. Further details from Dr Chris Miall, tel (0865) 282162 or Email rcm@physiol.ox.ac.uk. This is a non-smoking department.

Written applications including a CV and the names and addresses of two academic referees should be sent to the Assistant Administrator, University Laboratory of Physiology, Parks Road, Oxford OX1 3PT.

Closing date for: 16 September 1994.
**NEW LECTURERS SUPPORT SCHEME**

The Society has agreed to make an annual allocation of funds (£20,000 pa initially, with the possibility of an increased allocation in future if sufficient high quality applications are forthcoming) to assist young physiologists in developing independent research programmes and establishing themselves as independent researchers.

**Eligibility**

The Fund is available to academic staff on their first appointment to an established University Lectureship; those appointed to higher academic grades or to research fellowships will not be eligible. The Fund is intended to support research in physiology; applicants must therefore be Members or Affiliates of The Physiological Society. Applications must be made within 12 months of taking up an appointment. Applicants who are rejected may re-apply provided they have not been in post more than 12 months.

**Awards**

Applicants may request up to £5k to be used for consumables, equipment or, in exceptional cases, technical help (support for travel will not be allowed, as existing schemes provide for this). The application should contain a detailed costing and justification, but freedom to vire between headings will be allowed. Supplementary requests will not be considered in any circumstances.

**Applications**

Applicants will be required to provide a full account of the background and experimental plan of the proposed work (up to two sides of A4), together with a costing and justification of the support requested, a statement of how the proposed work will facilitate the development of an independent research programme and a full CV. Applications must be accompanied by a copy of the advertisement of the post filled by the applicant and a supporting letter from the Head of Department providing confirmation that the applicant has been appointed to a University Lectureship with the expectation of developing an independent research programme in Physiology and giving details of the institutional support that has been provided to facilitate this, eg details of laboratory space, financial support and teaching load.

**Evaluation**

Applicants will be considered by all members of the Grants Subcommittee twice a year (at the end of March and September) who will score all applicants, taking into account (a) the scientific quality of the applicant and application, (b) the probability that the proposed work will lead to important new physiological research, (c) the suitability of the proposed work in allowing the applicant to develop an independent research programme in physiology, and (d) the level of institutional support (this could include either financial support, or an initially reduced teaching and administrative burden). Successful applicants will be required to submit a report within 12 months of the funding date, describing the work done and the outcome in terms of full publications, Communications to the Society and applications to other funding bodies. Any further support for the applicant from Society funds will be contingent on submission of a satisfactory report.

Application forms are available from and should be returned to the Administration Office, PO Box 506, Oxford OX1 3XE, tel (0865) 798498, fax (0865) 798092. Before distribution to the Grants Subcommittee, the Administration Office will be asked to append to applications the details of any previous grants from the Society (and their outcome).
PHYSIOLOGY IN HONG KONG

I was awarded this year’s Royal Society Kan Tong Po Visiting Professorship. During my three month stay in Hong Kong, I was carrying out a collaborative project on the metabolic control of the coronary circulation with members of the Physiology Department at the University of Hong Kong. I was also invited to give research lectures on the metabolic control of the coronary circulation, neural control of vascular capacitance and the influence of cardiovascular reflexes on the kidney function, in the Chinese University of Hong Kong, 4th Military Medical University in Xi’an, and the Institute of Biomedical Sciences (Academia Sinica, Taipei, Taiwan) and Tzu-Chi Buddhist Hospital (Hualien, Taiwan). My visit culminated with a public lecture at Hong Kong University, entitled “How the heart talks to the kidney: does chemical clamping interfere with communication?” For this lecture I was introduced by Professor Tim Biscoe, the Deputy Vice Chancellor of Hong Kong University.

The University of Hong Kong provides visiting academics with free accommodation in Robert Black College. In this college, visiting professors/lecturers in different specialities from many countries, including the UK, USA, Australia and Canada, get a unique opportunity of meeting many scholars not only from the East but also from Europe, North America and Canada. Most of them are invited to give a series of lectures for a short period (a few weeks). Some of them are invited on a regular basis. Almost everybody seemed to enjoy living and working in the beautiful academic atmosphere of the University, which is spending a considerable part of its annual budget on the academic exchanges between its staff members and overseas experts.

University of Hong Kong and the Chinese University

There are two Physiology departments in two medical faculties in Hong Kong: one at the University of Hong Kong (over 80 years old) and another at the Chinese University, which was recently established (about 12 years ago). In both faculties the courses are taught in English, although almost all staff members are of Chinese origin. The medical graduates from both faculties can register with the British General Medical Council.

This Department of Physiology in the University of Hong Kong has 15 full time academics, 26 technicians, four secretaries and 26 postgraduates and is run by a Head, currently Professor David Kwan, who is democratically elected by the staff members from the Senior Colleagues for a period of several years. The day to day running of the Department, allocation of teaching and administrative duties seem to be very similar to that in any UK University department.

The staff members spend a great proportion of their time in teaching undergraduate medical students - about 340 in first and second year classes - and also about 50 dental and 20 speech & hearing sciences students. They provide well designed practicals (similar to those in the UK laboratories, if not better) and give regular tutorials in addition to lectures. The students are provided with very detailed handouts of their lectures and practicals. These, I felt, overloaded the students and took a lot of valuable time to prepare. However, teaching time in the Department does not seem to prevent productive research.

In comparison, the Department of Physiology at the Chinese University, which is situated on the other side of the Hong Kong river, has more or less the same numbers of staff and students, but is smaller in size, spacewise. There is no laboratory for large animal experiments and the members of this department feel strongly the lack of adequate integrative physiology for medical students due to non-availability of competent teachers in the field. The number of medically qualified teachers is negligible and they are very hard to come by, though the salaries of the academics are good.

Research

Most of the senior scientists (professors, readers etc) who were trained in the UK, USA, Australia or Canada are very familiar with the advanced research in various areas of Physiology. The staff members have research interests in many areas such as cell physiology of smooth muscle, haematology, neuroendocrinology, cardiovascular physiology, respiratory physiology, nutrition, pathophysiology and Chinese medicine. An adequate fund is allocated to the Department to cover costs for experimental animals, consumables and small pieces of equipment. The Department also has its own essential central facilities, such as mechanical and electrical workshops, computer aided learning laboratory, electron microscopes, etc, which are similar to those seen in any standard department in the UK. Two major grant giving bodies, the
University & Polytechnics Grants Committee and the Croucher Foundation consider applications for projects requiring expensive equipment and additional research staff. All staff members receive excellent support from the well trained technicians, some of whom work late in the evening on the day of experiment, a perfect condition for quality research. It is noticeable that the department has few post-doctoral fellows. After a postgraduate degree they go abroad for training. However, the publication list appears to be good (many original papers have been published in standard journals such as *J Physiol, Am J Physiol*) and staff members are encouraged to conduct joint research with foreign institutions through special grants. Travel grants for presenting results of the research at international meetings are widely available. Two members of the Department (Drs Heather Ballard and Mary Lung) come to Britain regularly to present the results of their research to the Physiological Society. The members have good contacts with universities and research institutions in mainland China and Taiwan. Some members are also editors of international journals. There are two societies: the Neuroscience Society and the Society for the Study of Endocrinology, Metabolism & Reproduction. They both organise annual scientific conferences.

Although the University of Hong Kong and two other recently established universities offer three year undergraduate courses in various faculties, none of these offers an undergraduate course majoring in Physiology. Therefore, the applicants for postgraduate positions in Physiology are mostly biology graduates from overseas, mainly from the Asian countries and occasionally from the UK. At present, there is one PhD student in Physiology in the Chinese University of Hong Kong, who did her undergraduate degree in Leeds a couple of years ago. The postgraduate study is similar to that in the UK, i.e. degree only by original research. The research topics and publications appear to be of a similar quality to those in the majority of UK departments.

The Future?

In all the institutions I visited, I could see some tendency of change from whole animal physiology to cellular and molecular science, though it is not as dramatic as in the majority of the institutions in the West. There, a sensible balance still exists between whole animal and cellular work but, as in Britain, grant applications for projects involving work on large animals are usually unsuccessful. Thus, there is a lack of appreciation and encouragement from grant giving bodies for doing complex integrative physiology and little emphasis on training the future generations of physiologists in whole animal physiology. However, unlike European countries, there are no violent protests from the animal rights activists against it. The Chinese physiologists are aware of the importance of keeping a good balance between cellular and whole body physiology for a clear understanding of medicine. There is, at this time, a great deal of speculation among the academics in Hong Kongian institutions about the future of their science and technology when Hong Kong joins mainland China in 1997. Chinese institutions do not seem to be as dynamic and the salaries of the academics are very poor. On the other hand, Hong Kong is a very exciting place, the people are very tolerant, very happy, hard working, doing quality research and, above all, very hospitable.

Dr Fazlul Karim
University of Leeds

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Erratum

*Apologies to Dr C Bell and all Australian Members for the omission of the state of Victoria on the map in the last issue.*
**TITLE**

- A single aspartate residue is involved in both intrinsic gating and blockage by Mg\(^2+\) of the inward rectifier, IK₁.
- Chloride currents of single mitochondria-rich cells of toad skin epithelium.
- Quantal nature of synaptic transmission at the cytoneural junction in the frog labyrinth.
- Signalling properties of identified deep cerebellar nuclear neurons related to eye and head movements in the alert cat.
- In vivo release of glutamate in nucleus tractus solitarii of the rat during hypoxia.

- Inhibition by 5-HT\(_7\) receptor stimulation of GABA\(_A\) receptor-activated current in cultured rat suprachiasmatic neurones.
- Modulation of GABA-mediated synaptic transmission by endogenous zinc in the immature rat hippocampus in vitro.
- Synaptic responses of substantia gelatinosa neurones to dorsal column stimulation in rat spinal cord in vitro.
- Mode of regulation by G protein of the ATP-sensitive K\(^+\) channel in guinea-pig ventricular cell membrane.
- The effect of rapid local cooling on human finger nailfold capillary blood pressure and blood cell velocity.
- Synaptic transmission from splanchnic nerves to the adrenal medulla of guinea-pigs.
- The upregulation of acetylcholine release at endplates of α-bungarotoxin-treated rats: its dependency on calcium.
- Variation in myoplasmic Ca\(^2+\) concentration during contraction and relaxation studied by the indicator fluo-3 in frog muscle fibres.
- The metabolic responses of human type I and II muscle fibres during maximal treadmill sprinting.
- Effects of hypercapnia on membrane potential and intracellular calcium in rat carotid body type I cells.
- Proprioceptive, visual and vestibular thresholds for the perception of sway during standing in humans.

- Short Papers given rapid review.

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARSEN, Erik Hviid &amp; HARVEY, Brian J</td>
<td>7</td>
</tr>
<tr>
<td>ROSSI, M Lisa, MARTINI, Marta, PELUCCHI, Brunca &amp; RESCE, Riccardo</td>
<td>17</td>
</tr>
<tr>
<td>GRIJAT, A &amp; DELGADO-GARCIA, J M</td>
<td>37</td>
</tr>
<tr>
<td>MIZUSAWA, Akiko, OCAGAWA, Hiromasa, KIKUCHI, Yoshihiro, HIDA, Wataru, KOBOSAWA, Hajime, OKABE, Shinichi, TAKISHIMA, Tamotsu &amp; SHIRATO, Kunio</td>
<td>55</td>
</tr>
<tr>
<td>KAWAHARA, Fumio, SAITO, Hiroshi &amp; KATSUKI, Hiroshi</td>
<td>67</td>
</tr>
<tr>
<td>XIE, Xinmin, HIDER, Robert C &amp; SMART, Trevor G</td>
<td>75</td>
</tr>
<tr>
<td>BABA, H, YOSHIMURA, M, NISHI, S &amp; SHIMOJ, K</td>
<td>87</td>
</tr>
<tr>
<td>ITO, Hiroyuki, VEREECKE, Johan &amp; CARMELIJET, Edward</td>
<td>101</td>
</tr>
<tr>
<td>HAHN, Martin &amp; SHORE, Angela C</td>
<td>109</td>
</tr>
<tr>
<td>HOLMAN, Mollie E, COLEMAN, H A, TONTA, Mary Anne &amp; PARKINGTON, Helena C</td>
<td>115</td>
</tr>
<tr>
<td>PLOMP, J J, VAN KEMPEN, G TH H &amp; MOLENAAR, P C</td>
<td>125</td>
</tr>
<tr>
<td>CAPUTO, C, EDMAN, K A P, LOU, F &amp; SUN, Y-B</td>
<td>137</td>
</tr>
<tr>
<td>GREENHALL, P L, NEVILL, M E, SODELUND, K, BODIN, K, BOOBS, L H, WILLIAMS, C &amp; HULTMAN, E</td>
<td>149</td>
</tr>
<tr>
<td>BUCKLER, Keith J &amp; VAUGHAN-JONES, Richard D</td>
<td>157</td>
</tr>
<tr>
<td>FITZPATRICK, Richard &amp; MCCLOSKEY, D I</td>
<td>173</td>
</tr>
</tbody>
</table>
Rapid regulation of rat jejunal glucose transport by insulin in a luminally and vascularly perfused preparation

- G-protein control of voltage dependence as well as gating of muscarinic metabotropic channels in guinea-pig ileum

Cotransport of K+, Cl− and H2O by membrane proteins from choroid plexus epithelium of Necturus maculosus

Nicotinic and muscarinic ACh receptors in rhythmically active spinal neurones in the Xenopus laevis embryo

Release and synthesis of acetylcholine at ectopic neuromuscular junctions in the rat

In vivo voltammetric measurement of evoked extracellular dopamine in the rat basolateral amygdaloid nucleus

Interactions among calcium compartments in C6 rat glioma cells: involvement of potassium channels

 Sulphorhodamine-labelled cells in the neonatal rat spinal cord following chemically induced locomotor activity in vitro

A rise in the intracellular Ca2+ concentration of isolated rat suprachiasmatic cells in response to oxytocin

Ionophoretically applied acetylcholine and vagal stimulation in the arrested sinus venosus of the toad, Bufo Marinus

Effect of metabolic inhibitors and second messengers upon Na+−H+ exchange in sheep cardiac Purkinje fibre

Simultaneous expression of cardiac and skeletal muscle isoforms of the L-type Ca2+ channel in a rat heart muscle cell line

Effects of intracellular pH and [Mg2+] on excitation-contraction coupling in skeletal muscle fibres of the rat

Unloaded shortening velocity and myosin heavy chain and alkali light chain isoform composition in rat skeletal muscle fibres

A study of the action of bradykinin and bradykinin analogues in the human nasal airway

Load dependence of changes in forearm and peripheral vascular resistance after acute leg exercise in man

Task-dependent reflex responses and movement illusions evoked by galvanic vestibular stimulation in standing humans

* Short Paper given rapid review
TITLE

• Endogenous H⁺ modulation of NMDA receptor-mediated EPSCs revealed by carbonic anhydrase inhibition in rat hippocampus

Enhanced NMDA conductance can account for epileptiform activity induced by low Mg²⁺ in the rat hippocampal slice

• K⁺-aggravated myotonia: destabilization of the inactivated state of the muscle Na⁺ channel in human embryonic kidney cells

Prevention of Ca²⁺-mediated action potentials in GABAergic local circuit neurones of rat thalamus by a transient K⁺ current

Relationship between morphology and physiology of pyramid-pyramid single axon connections in rat neocortex in vitro

α₁-Adrenoceptors in rat dorsal raphe neurons: regulation of two potassium conductances

Swelling-induced anion and cation conductances in human epididymal cells

Flash photolysis studies of the localization of calcium release sites in rat parotid isolated acinar cells

Concomitant activation of Cl⁻ and K⁺ currents by secretory stimulation in human epithelial cells

Activation of ATP-sensitive potassium currents in guinea-pig gall-bladder smooth muscle by the neuropeptide

Effects of rapid changes of external Na⁺ concentration at different moments during the action potential in guinea-pig myocytes

Effects of pH and inorganic phosphate on rigor tension in chemically skinned rat ventricular trabaculae

Stretch activation, unloaded shortening velocity, and myosin heavy chain isoforms of rat skeletal muscle fibres

Mechanism of action of BRL 38227 on ATP-sensitive K⁺ channels in dissociated mouse skeletal muscle fibres

Spatial cues serving the tactile directional sensibility of the human forearm

• Short Papers given rapid review

AUTHOR

GOTTFRIED, J A & CHESLER, M 373

TRAUB, Roger D, JEFFERYS, John G R & WHITTINGTON, Miles A 379


PAPE, H-C, BUDOE, T, MAGER, R & KISVARDAY, Z F 403

DEUCHARD, Jim, WEST, David & THOMSON, Alex M 423

PAN, Z Z, GRUDT, T J & WILLIAMS, J T 437

CHAN, H C, FU, W O, CHUNG, Y W, HUANG, S J, CHAN, P S F & WONG, P Y D 449

HAJSONI, Abdul A & GRAY, Peter T A 461

BARO, Isabelle, ROCH, Brigette, HONGRE, Anne-Sophie & ESCANDE, Denis 469

ZHANG, Lei, BONEV, Adrian D, NELSON, Mark T & MAWE, Gary M 483

LE GUENNEC, Jean Yves & NOBLE, Denis 493

SMITH, G L & STEELE, D S 505

GALLER, Stefan, SCHMITT, Thomas L & PETTE, Dirk 513

HUSSAIN, MUNIR, WAREHAM, Anthony C & HEAD, Stewart I 523

NORSELL, Ulf & OLAUSSON, Hakan 533
Inhibition of Ca\(^{2+}\) entry by Ca\(^{2+}\) overloading of intracellular Ca\(^{2+}\) stores in human platelets

Constitutive upregulation of calcium channel currents in rat phaeochromocytoma cells: role of c-fos and c-jun

Effects of palmitoyl carnitine and related metabolites on the avian Ca\(^{2+}\)-ATPase and Ca\(^{2+}\) release channel

Photoreleased inositol 1,4,5-trisphosphate-induced response in single smooth muscle cells of rat portal vein

Fast presynaptic GABA\(_A\) receptor mediated Cl\(^-\) conductance in cultured rat hippocampal neurones

A unique amino acid of the Drosophila GABA receptor with influence on drug sensitivity by two mechanisms

Functional expression of A-currents in embryonic chick sympathetic neurones during development in situ and in vitro

Mechanism for reactivation of the ATP-sensitive K\(^+\) channel by MgATP complexes in guinea-pig ventricular myocytes

Origin of delayed outward ionic current in charge movement traces from frog skeletal muscle

The roles of K\(^+\) conductance in expiratory pattern generation in anaesthetized cats

Exercise-induced changes in plasma potassium and the ventilatory threshold in man

Intercostal muscle compensation for parasternal paralysis in the dog: central and proprioceptive mechanisms

Neurally maintained hypersecretion in undernourished rat intestine by E. coli STa enterotoxin and cyclic nucleotides in vitro
### Title

**Review Article**

Spatial *versus* consumptive competition at polyneuronally innervated neuromuscular junctions

### Full Length Papers

A novel method for recording whole-cell and single-channel currents from differentiating cerebellar granule cells *in situ*

The effects of oesophageal distension on diaphragm and laryngeal muscle activity in the anaesthetized cat

The effect of immobilization on the recovery of rabbit soleus muscle from tenotomy: modulation by chronic electrical stimulation

The role of parathyroid hormone-related protein in calcium homeostasis in the fetal pig

Calcium influx and release in isolated rat osteoclasts

Fluid hypersecretion induced by enterotoxin STa in nutritionally deprived rats: jejunal and ileal dynamics *in vivo*

Inhibitory effect of milk fat on milk secretion in the mouse: a re-examination

Increased mammary blood flow in the lactating goat induced by parathyroid hormone-related protein

The relationship between ischaemic conduction failure and conductive velocity in cat myelinated axons

The contribution of ischaemia and deformation to the conduction block generated by compression of the cat sciatic nerve

### Rapid Communications

The effect of high concentrations of inspired oxygen on middle cerebral artery blood velocity measured by transcranial Doppler

Hypoxia activates a potassium current in isolated smooth muscle cells from large pulmonary arteries of the rabbit

Changes in human and rat uterine phosphoethanolamine and taurine with pregnancy and parturition

### Author

**RICHETER, Richard R & BARRY, Jacqueline, A** 465

**RADDEN, Elisabeth, BEHRENS, Marko, PEBERMANN, Fritz W & SCHMIDTMAYER, Johann** 495

**JONES, J F X, McKedigh, D, NOLAN, P & O'REGAN, R G** 505

**BARRY, J A, Cotter, M A, CAMERON, N E & PATTULLO, M C** 515


**SHANKAR, Vijai S, HUANG, Christopher L-H, ADEBANJO, Olugbenga A, PAZIANAS, Michael & ZAIDI, Mon** 537

**NGOWU, Helen C & LEVIN, R J** 547

**PEAKER, M & TAYLOR, E** 561

**PROSSER, C G, FARR, V C & DAVIS, S R** 565

**FERN, Robert & HARRISON, P J** 571

**FERN, Robert & HARRISON, P J** 583

**BEW, S A, FIELD, L M, DROSTE, D W & RAZIS, P** 593

**BONNET, P, VANDIER, C, CHELIKINE, C & GARNIER, D** 597

**PHOENIX, J & WRAY, S** 601
**G W Harris Lecture**

The gut endocrine system and its control

**Full length Papers**

- The relationship between blood flow and diameter in the iliac artery of the anaesthetized dog: the role of endothelium-derived relaxing factor and shear stress
- Laminin mediates the restitution of rat gastric mucosa in vitro
- The effect of frusemide on oxytocin-induced contractions of the rat myometrium
- Effects of intracellular pH on calcium currents and intracellular calcium ions in the smooth muscle of rabbit portal vein
- Developmental and gestational changes of phosphoethanolamine and taurine in rat brain, striated and smooth muscle
- Primary and secondary afferent discharges from the same spindle during chain fibre contraction in cat tenuissimus muscle
- The intracortical neuronal connectivity subserving focal epileptiform activity in rat neocortex
- Acid-base transport systems in a polarized human intestinal cell monolayer: Caco-2
- A new approach to measuring transepithelial potentials in bovine lens reveals a chloride-dependent component
- Sodium and chloride transport across the rumen epithelium of cattle in vitro: effect of short-chain fatty acids and amiloride
- Interaction of aldosterone and oxytocin to influence renal sodium excretion in rats
- Activation of the vasopressin-sensitive water permeability pathway in the toad bladder by N-ethyl maleimide
- The effect of a hyposmotic shock on amino acid efflux from lactating rat mammary tissue stimulation of taurine and glycine efflux via a pathway distinct from anion exchange and volume-activated anion channels
- Differentiation of the peripherally mediated form the centrally mediated influences of adenosine in the rat during systemic hypoxia
- Indirect measurement of saliva secretion in sheep fed diets of different structures and the effect of such diets on ruminal fluid kinetics and fermentation pattern
- An explanation for residual increased tension in striated muscle after stretch during contraction
- Calcium currents and contraction in frog atrial trabeculae
- Interaction between secretin and nerve-mediated amylase secretion in the isolated exocrine rat pancreas

**Rapid Communication**

- A linear relationship between ATP degradation and fatigue during high-intensity dynamic exercise in rat skeletal muscle

**Book Review**
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. For the Winter 1994 (Birmingham) edition should reach the Administration Office by 18 October.

British Neuroendocrine Group
ANNUAL MEETING
12-13 September 1994
University of Manchester
This meeting includes a workshop on cytokine measurement, symposia on interactions between cytokines and the endocrine system and regulation and modulation of neurohypophysial secretion. The Mortyn Jones annual lecture will be given by Prof K Landgraf and there will be free communications and posters. Further details from: Mrs J Clark, School of Biological Sciences, Room 1.124, Stopford Building, University of Manchester, Oxford Road, Manchester M13 9PT, tel (061) 275 5351, fax (061) 275 5363

Physiological Society Symposium
NERVE GROWTH AND NERVE GUIDANCE
13 September 1994
Marischal College, Aberdeen
A one-day symposium, sponsored by The Physiological Society, on the day before the Aberdeen Meeting. Speakers: C E Bandtlow (Zurich), J Cohen (London), R W Davenport (USA), P Doherty (London), P Grabham (USA), P W Gordon-Weeks (London), C D McCaig (Aberdeen), K R Robinson (USA) and D M Snow (USA). Further details from: Dr Colin McCaig, Dept of Biomedical Sciences, Marischal College, University of Aberdeen, Aberdeen AB9 1AS, tel (0224) 273016, fax (0224) 273019

MODELLING AND CONTROL OF VENTILATION
17-20 September 1994
Royal Holloway & Bedford New College, London
Sponsored by The Physiological Society. Further details from: Mrs Liz Murray, Dept of Medicine, Chartering Cross & Westminster Medical School, Fulham Palace Road, London W6 8RP

Associazione Scienze Cardiovascolari
International Workshop
AN UPDATE OF CARDIOVASCULAR CONTROL: INTERPLAY BETWEEN CENTRAL AND PERIPHERAL MECHANISMS
29 September-1 October 1994
Trento, Italy
The Scientific Committee welcomes the submission of abstracts. Further details from: Michael P Gilbey, Dept of Physiology, Royal Free Hospital Medical School, Rowland Hill Street, London NW3 2PF, tel (071) 794 0500 Ext 4318, fax (071) 433 1921

Autumn School
COGNITIVE NEUROSCIENCE
3-5 October 1994
University of Oxford
The three days are devoted to Motor Control, Vision and Language & Cognitive Neuroscience. The course is offered free of charge to undergraduates and graduates. Further details from: Administrative Secretary, MRRC Research Centre in Brain & Behaviour/McDonnell-Pew Centre for Cognitive Neuroscience, Dept of Experimental Psychology, South Parks Road, Oxford OX1 3UD, tel (0865) 271501 (am) or 272947 (pm), fax (0865) 310447, Email cogneuro@ox.ac.uk

Society for Endocrinology
MOLECULAR BIOLOGY WORKSHOP
10 October 1994
Birmingham
Further details from: Janet Crompton, Society for Endocrinology, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS12 4NQ, tel (0454) 619036, fax (0454) 616071

Training Workshop
VASCULAR BIOLOGY FOR CLINICAL RESEARCH
20-22 October 1994
St Thomas' Hospital, London
This meeting will give an overview of the current state of laboratory research into vascular disease and in particular will describe the various methodologies that are used and outline current areas of interest. It is primarily designed for both basic scientists and clinicians who are interested in entering this rapidly developing and topical research arena but who have limited experience in this field. Review lectures on major subjects such as atherosclerosis, reperfusion injury, angiogenesis and hypertension will be interspersed with more technical talks covering techniques as varied as molecular biology, cell adhesion and electrophysiology. Sessions will be presented by a team of international experts, chosen for their practical expertise. Participants will have the opportunity to discuss their current or proposed research. Further details from: Miss Alison Halliday, Division of Surgery, St Thomas' Hospital, Lambeth Palace Road, London SE1 7EH, tel (071) 928 9292 Ext 2516, fax (071) 928 8742

Acta Physiological Scandinavica Symposium
THE ROLE OF EDKF/NO IN THE VASCULAR AND NERVOUS SYSTEMS
21-22 October 1994
Bergen, Norway
In conjunction with the Scandinavian Physiological Society meeting. Key topics: role of EDRF/NO in normal cardiovascular physiology and in cardiovascular disease, role of NO plasticity in the central nervous system. Invited speakers from Denmark, France, Germany, Sweden, UK, USA. Further details from: Prof Knut Aukland, Dept of Physiology, Arstadv 19, N-5009 Bergen, Norway, tel (010 47) 55206406, fax (010 47) 55206410

Society for Endocrinology
15th MEETING
23-25 November 1994
London
Further details from: Janet Crompton, Society for Endocrinology, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS12 4NQ, tel (0454) 619036, fax (0454) 616071

British Society for Cardiovascular Research
Winter Meeting
DRUGS FOR THE HEART
8-9 December 1994
Bristol Royal Infirmary, Bristol
Further details from: Dr S J Coker, Dept of Pharmacology & Therapeutics, University of Liverpool, PO Box 147, Liverpool L69 3BX, tel (051) 794 5550, fax (051) 794 5540

15th ALTERNATIVE MUSCLE CLUB
18-20 December 1994
University of Leeds
This meeting is held annually to give PhD students and postdocs in the field of muscle biology a chance to present their work in a relatively informal atmosphere. This year's guest speaker is the eminent muscle biologist, Sir Andrew Huxley. Sessions will cover topics as diverse as genetic point mutations and whole muscle mechanics. This year we hope to introduce sessions on cardiac muscle and sports science. Special registration rates apply for Affiliates of The Physiological Society. Further details from: Dr Valerie Cox/Dr Nicola Osvaldston, Muscle Research, Level 11, Worsley Building, University of Leeds, Leeds LS2 9JT, tel (0532) 335893, fax (0532) 334803. See Young Physiologists section for further information

Society for Endocrinology
POSTGRADUATE TRAINING COURSE IN ENDOCRINOLOGY
22-25 November 1994
Cardiff
Further details from: Janet Crompton, Society for Endocrinology, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS12 4NQ, tel (0454) 619036, fax (0454) 616071

NEUROLOGY FOR NEUROSCIENTISTS
27-28 March 1995
Magdalen College, Oxford
A two-day symposium to demonstrate how clinical neurology can illuminate neural function and help neuroscientists. Sponsored by the Guarantors of Brain, everything is covered, even some graduate students' travel expenses, for a nominal registration of £20. For further details, send a short CV (in the event of oversubscription) to: Prof J B Clark, Neurochemistry, National Hospital, Queen Square, London WC1N 3BG, tel (071) 829 8722
International Meeting
LIPOSOME BIRTHDAY CONFERENCE
27-30 March 1995
The Babraham Institute & St
Catharine's College, Cambridge
Main speakers include: A Bangham
(Babraham), D Papahadjopoulos (San
Francisco), V Skulachev (Moscow), R Pagano
(Baltimore), L Leserman (Marseille), C
Alving (Washington), G Lopez-Berestein
(Houston), L Huang (Pittsburgh). Poster
space is available and workshops will be
held on membrane topology, gene therapy,
product development, drug delivery,
dimensional and skin care. Deadline for
registration: 30 December 1994. Further
detail from: Zeller MacDougall, The
Babraham Institute, Babraham, Cambridge
CB2 4AT, tel (0223) 852312, fax (0223)
833676. ★

British & European Federation of
Endocrine Societies
14th JOINT MEETING
27-30 March 1995
Warwick
Programme Organising Committee
chairman: Prof J A H Wass, St
Bartholomew's Hospital, London. Symposia
to include: nuclear receptors, the calcium
receptor, role of growth factors in mammary
growth, global fertility control,
neuroendocrine control by excitatory amino
acids and nitrous oxide, the endocrinology
of the desperately ill, intracellular signalling
of metabolic peptides. Clinical management
workshops to include: thyroid cancer,
Turner's syndrome, hyponatraemia and
diabetes insipidus. There will also be
methods updates sessions and a molecular
endocrinology workshop. Deadline for
Further details from: Janet Crompton, British
Endocrine Societies, 17/18 The Courtyard,
Woodlands, Almondsbury, Bristol BS14
4NQ, tel (0454) 619036, fax (0454) 616071. ★

International Union of Biological
Sciences
4th International Congress of
COMPARATIVE PHYSIOLOGY AND
BIOCHEMISTRY
6-11 August 1995
Birmingham
Further details from: Moira Wilson,
Universal Conference Consultants, China
Court Business Centre, Ladywell Walk,
Birmingham B5 4RX, tel (021) 622 3644, fax
(021) 622 2333 ★

Wellcome Centre for Medical Science
One Day Open Meetings
The Wellcome Centre, in collaboration with
the CIBA Foundation, is organizing 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, including
refreshments, lunch and documentation.
2 September: Non-reproductive action of sex
steroids
Further information from: Sheila Pusinelli,
tel (071) 636 9456 ★★★

Apologies
Apologies to Dave Berry, who supplied all
the inside front cover photographs of the
Liverpool Meeting for the Cambridge issue
of the Magazine, for omitting his name there.

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.

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.

The Benevolent Fund
of The Physiological Society
The Fund is to be used:

(i) for the purpose of assisting Members of the
Society and staff and former staff (who by the
nature of their employment can be considered
to have contributed to the advance of physiology)
employed at teaching research and industrial
establishments concerned with the advancement
of physiology who are in necessitous
circumstances and the wives husbands widows
undowned children and other dependants of such
persons (hereinafter called "the Beneficiaries")...

The Trustees have the powers:

(i) to pay subscriptions and make donations to
hospitals homes or institutions having amongst
their objects the succour of such persons*'

Please contact one of the Trustees (see
Committee News) if you know of anyone
whom the Fund might be able to help.

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) 640618/275004

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

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.
PUBLICATIONS OF THE PHYSIOLOGICAL SOCIETY

Journals
The Journal of Physiology

Administration & Publications Office, PO Box 506, Oxford OXI 3XE, tel (0865) 798498, fax (0865) 798092.

Prices: hardback £35.00 ISBN 0-7190-2423-2; paperback £11.95 ISBN 0-7190-2433-1


The above titles are available from The Physiological Society, Administration & Publications Office, PO Box 506, Oxford OX1 3XE, tel (0865) 798498, fax (0865) 798092. [Price to Affiliates: $9.35, Price to Members: £2 per set of four, excluding Neuronal Communications, plus postage. Copies are also available at the Society's stand at Scientific Meetings.]

Studies in Physiology

Monographs of The Physiological Society
No 41: The Energetic Aspects of Muscle Contraction (1985) Wolek, Curtin & Homsher
No 42: Memoir on the Pancreas (1985) Bernard & Henderson


Experimental Physiology

Studies in Physiology

Books


Careers Information

Physiology: An Inside View Video available to residents of UK/Eire on loan free of charge. Available from: The Physiological Society, Administration & Publications Office, PO Box 506, Oxford OX1 3XE, tel (0865) 798498, fax (0865) 798092.
The Physiological Society has allocated £40,000 to assist younger Members and Affiliates of the Society to attend the Joint Meeting with the Japanese Physiological Society and the associated joint symposium with the Korean Physiological Society. Of this sum, £15,000 has been earmarked for Affiliates; further funds will therefore not be available under the Affiliate Travel Grant scheme nor from the Dale Fund.

This form, typed or clearly printed, should be returned to: The Administrator (Grants for Japan), The Physiological Society, PO Box 506, Oxford OX1 3XE, tel (0865) 798498, fax (0865) 798092, no later than 14 November 1994.

Surname (in capitals) ........................................  Title & Forenames ........................................

Work Address ...........................................................

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

Work Tel No ..........................................................

Fax No ..........................................................

Appointment/Status ................................................

Date of Birth ..................................................

Employer/Funding Body ........................................

Details of employment or status
Please tick one box
Member of UK/Irish department of Physiology or related sciences:
  graduate student
  postdoctoral worker
  academic staff member
  technical staff member
  visitor

*NHS clinician not part of a Medical School
*Member of MRC/SERC/AFRC research institute or equivalent
*Other (please give details below)

Title of abstract: ..........................................................

Other sources of funds: give details of other bodies to which you have applied or intend to apply for funding, including the maximum possible award and the probable date of notification:

NOTE: if you have ticked an asterisked box, please supply a covering note explaining why you need assistance from the Society.

Signed .............................................................  Dated ..........................................................

Signature of Head of Department confirming eligibility if not Member or Affiliate:

Signed .............................................................  Name ..........................................................
<table>
<thead>
<tr>
<th>TITLE</th>
<th>PURPOSE</th>
<th>ELIGIBILITY</th>
<th>AWARDS</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliate Travel Grant Scheme</td>
<td>To enable Affiliates to attend meetings and symposia overseas</td>
<td>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)</td>
<td>Up to £600</td>
<td>Applications are considered at the end of January, March, May, July, September and November</td>
</tr>
<tr>
<td>Benevolent Fund</td>
<td>To assist persons who have contributed to the advancement of Physiology and are in necessitous circumstances</td>
<td>Physiologists, their staff and dependants</td>
<td>Depend on circumstances</td>
<td>Applications are reviewed immediately on receipt</td>
</tr>
<tr>
<td>Bursaries</td>
<td>To support graduates undertaking MSc courses in physiological disciplines who cannot obtain funds from other sources</td>
<td>Science graduates of institutions in the British Isles</td>
<td>Up to £2,000</td>
<td>Applications are considered at the end of May and November</td>
</tr>
<tr>
<td>Dale Fund</td>
<td>To promote new physiological research in the British Isles</td>
<td>Physiologists working in the British Isles</td>
<td>Up to £500 for travel grants for collaborative research, learning new techniques, attending practical workshops and training courses. Up to £200 for travel to conferences and symposia</td>
<td>Applications are considered throughout the year</td>
</tr>
<tr>
<td>Eastern European and Third World Support Scheme</td>
<td>To support centres of scientific excellence where high quality physiological research is threatened by lack of resources</td>
<td>Centres of physiological research in Eastern European and Third World countries demonstrating scientific excellence and financial need</td>
<td>Up to £10,000 per annum, for up to three years</td>
<td>Applications are considered at the end of January, March, May, July, September and November</td>
</tr>
<tr>
<td>Eastern European and Third World Visitor Fund</td>
<td>To allow physiological workers in Eastern European and Third World countries to visit laboratories in the British Isles</td>
<td>Physiologists in Eastern European and Third World countries seeking to undertake collaborative research in the British Isles</td>
<td>Up to £1,500</td>
<td>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</td>
</tr>
<tr>
<td>New Lecturers Support Scheme</td>
<td>To help young physiologists to establish independent research programmes</td>
<td>Academic staff in the first year of their first appointment to an established University lectureship in the UK or Eire</td>
<td>Up to £5,000 for consumables, equipment and, in exceptional cases, technical help</td>
<td>Applications are considered at the end of March and September</td>
</tr>
<tr>
<td>Postgraduate Support Fund</td>
<td>To assist the completion of research projects which have been delayed due to circumstances outside the applicant's control</td>
<td>Graduates (normally PhD students) in departments of Physiology or a cognate science in the British Isles, whose supervisors are Members of the Society</td>
<td>Up to £1,000</td>
<td>Applications should normally be submitted before 31 July, but may be considered at other times</td>
</tr>
<tr>
<td>Rushton Fund</td>
<td>To promote new physiological research in the British Isles</td>
<td>Young physiologists working in the British Isles who are not yet Members of the Society</td>
<td>Up to £500 for travel grants for collaborative research, learning new techniques, attending practical workshops and training courses.</td>
<td>Applications are considered throughout the year</td>
</tr>
<tr>
<td>Vacation Studentships</td>
<td>To enable undergraduates to undertake research projects in the summer vacation</td>
<td>Undergraduates in the UK and Eire in their second year or above, for work in the laboratory of a Member of the Society</td>
<td>Up to £500, for maintenance (no support available for consumables or other research expenses)</td>
<td>Applications must be submitted by 31 March</td>
</tr>
</tbody>
</table>

GRANTS AND FUNDING SCHEMES
Affiliation Form

Confidential
APPLICATION FORM FOR AFFILIATION TO THE PHYSIOLOGICAL SOCIETY

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

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

Interests: IUPS classes / / Groups: ........................................................................................................

(See overlay for codes)

Work address ...........................................................................................................................................................................................................................................................

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

Electronic mail address ..........................................................................................................................................................................................................................

Present Course/Postdoctoral Position ............................................................................................................................................................................................................................

Qualifications:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Date</th>
<th>Subject</th>
<th>Awarding Institution</th>
</tr>
</thead>
</table>

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

Tel ........................................................................................................................................ Fax ........................................................................................................................................ Date

Address ............................................................................................................................................................................................................................

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:-

<table>
<thead>
<tr>
<th></th>
<th>UK &amp; Eire</th>
<th>Europe</th>
<th>Non-Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Abstracts</td>
<td>£10</td>
<td>£30</td>
<td>£35</td>
</tr>
<tr>
<td>Without Abstracts</td>
<td>£5</td>
<td>£15</td>
<td>£20</td>
</tr>
</tbody>
</table>

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
02 Anatomy & Embryology
03 Biochemistry
04 Biophysics
05 Biomedical Engineering
06 Blood
07 Cardiovascular
08 Cellular & Tissue
09 Comparative Physiology
10 Electrolyte & Water Balance
11 Endoines
12 Energy Metabolism & Temperature Regulation
13 Environmental
14 Enzymes
15 Gastrointestinal
16 General Physiology
17 Immunology
18 Liver & Bile
19 Lipids & Steroids
20 Microbiology
21 Minerals, Bone & Teeth
22 Muscle & Exercise
23 Neuroscience
24 Nutrition & Food
25 Pathology
26 Pharmacology
27 Radiation
28 Renal
29 Reproduction
30 Respiration

You may specify up to three fields of interest.

Special Interest Groups
Current Codes

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

... Trinity college was the venue on Wednesday for....

... but did not extinguish their good spirits.
(Victoria Porrice and Jay Solanaski, Treasury staff)

... nor the barbecue....

... which was enjoyed by all (Left to right, John Widdicombe, Joan Abbott, Richard Dyball, Saffron Whitehead, Heather Dalitz, Mandy Kingsmill)

Sir John Vane outside the Physiological Laboratory, before delivering the 1994 Bayliss-Starling Prize Lecture
Photograph by Ander McIntyre

Production Editors Jonathan Goodchild and Carol Huxley with the Publications Office stand

On Thursday, the sun returned for Sherry on the lawn at Pembroke College....

... and the Society Dinner at King's College,
where Carol Leighton (pictured, centre, with supervisors Annette Dolphin and Alistair Mathie) was presented with her Pfizer Prize.

Photographs above and right by Ander McIntyre

Back cover photograph
Secretory granule exocytosis from an atrial myocyte (m) arrested by 1% tannic acid (BDH; mol wt, 1701 kDa; pH 7.4) over a 30 min perfusion period. Large numbers of fusion sites can be obtained, with a well defined glycocalyx over the fusion pore (arrowed Fig 1).
Fig 1, bar, 100nm, Back cover, bar, 0.5 μm.
See Terry Newman's article in the Teaching and Technology section.