The
Physiological
Society
Magazine

King's College Meeting

Features on:

Calcium-sensing receptors

Society governance proposals

34th International Congress of Physiological Sciences
26 – 31 August 2001
New Zealand

Winter 2000
No 41
The Hodgkin Building and Henriette Raphael House, looking from New Hunts House across the Memorial Park

(i-r) Sophie Pezet, Steve Thompson, Natalie Gardiner and Will Cafferty

Malcolm Osmundson, (i-r) Kirsty Mallett, Heidi Hill, Matt Hallsworth, School Resource Manager Tom Robertson and Jeremy Ward

Front cover photograph: Immunofluorescence micrograph of a section of rat kidney cortex showing the distribution of Ca²⁺-sensing receptors (CaRs), seen as bright staining. Different regions of the kidney nephron, all cut in cross-section, show variations in staining pattern reflecting subtly different localization of the CaR (see article by Ward and Riccardi, page 8)
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These guidelines are intended to assist authors in writing their contributions and to reduce the subsequent editing process. The Magazine Editorial Group is trying to ensure that all articles are written in a journalistic style so that they will have an immediate interest value for a wide readership and will be readable and comprehensible to non-experts. In particular, scientific articles should give a good overview of a field rather than focus on the authors' own research.

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

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

Submission of articles
Authors should submit text in the form of a disk accompanied by a printout wherever possible. Use of disks reduces the risk of introduction of errors during retyping. It is helpful to give brief details of the computer, operating system and software package(s) used.

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

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

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

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

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

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WELCOME TO KING’S COLLEGE LONDON

Introduction

We are pleased to welcome you to King’s College London for the first meeting of the Physiological Society at the new merged College on the Guy’s Campus at London Bridge. We believe that we have an exciting programme of symposia, workshops and special lectures as well as a myriad of communications and posters. For lunch you will be able to visit many good pubs and restaurants in the area or use the College and Hospital facilities. Should you feel the urge to do your last minute Christmas shopping, the new Jubilee Line Underground station at London Bridge gives rapid access to the West End. The last meeting of the Society at King’s was held at the Strand in December 1995, and more recently meetings have been held at UMDS on the St Thomas’s Campus in November 1997 and on the Guy’s site early in 1998.

Mergers and all that

The organisation of Basic Sciences, Dental and Medical teaching in the Capital has undergone many changes in the last 30 years. In the 1960s there were 12 undergraduate clinical Medical Schools, eight of which had small pre-clinical departments whilst the students of University College Hospital did pre-clinical studies at University College. The pre-clinical departments of King’s College in the Strand prepared students for clinical training at King’s College Hospital, St George’s Hospital and the Westminster Hospital. Following a series of mergers there are now only five Medical Schools. In addition, in the sixties, there were five undergraduate Dental Schools, now there are only two. Physiology was taught to science students at Queen Elizabeth College in Kensington, at Chelsea and Bedford Colleges as well as at King’s and University College.

In 1982, Guy’s Hospital Medical School and St Thomas’ Hospital Medical School merged to form the United Medical and Dental Schools of Guy’s and St Thomas’ Hospitals (UMDS) but continued to run separate courses until 1989 when the two Physiology departments amalgamated on the St Thomas’ site, occupying space vacated by the Anatomy and Biochemistry Departments which both moved to Guy’s. It is interesting that prior to 1870 both hospitals were sited in St Thomas’s Street by London Bridge, with St Thomas’s being across the road from the oldest part of the present Guy’s. There may have been some form of merger even then since the two were referred to as the United Borough Hospitals. With the building of London Bridge railway station, St Thomas’s was rebuilt on its present site on the south bank of the Thames opposite Parliament. In 1983, the Royal Dental Hospital, including their pre-clinical staff based at St George’s, merged with UMDS. In 1985, King’s College London merged with Chelsea College and Queen Elizabeth College. While this merger allowed the geographical consolidation of many departments, those comprising the Division of Biomedical Sciences (Anatomy and Human Biology, Physiology, Pharmacology, Molecular Biology and Biophysics, and latterly Physiotherapy) remained on the various campuses of the original Colleges (Strand, Kensington and Chelsea). The Physiology department was split between the Strand site where most of the medical and dental students were based and the Kensington site where most of the BSc students were based.

On 1st August 1998, King’s College London (KCL) merged with the United Medical and Dental Schools of Guy’s and St Thomas’ Hospitals (UMDS). This provided the opportunity for the College to consolidate on three major campuses, Strand, Waterloo and Guy’s, all within a single square mile of central London. Clinical, medical and dental teaching and research continue at King’s College, Guy’s and St Thomas’ Hospitals and at the Institute of Psychiatry in Denmark Hill. The partnership between the Schools of
Biomedical Sciences, Medicine and the Dental Institute is recognised by the prefix GKT (Guy's, King's and St Thomas'); special links exist between these schools by virtue of their common interest in medical and dental education and biomedical research.

The GKT School of Biomedical Sciences was formed by merging the former Division of Biomedical Sciences at KCL with the Basic Medical Sciences Departments at UMDS. In the summer and early autumn of 1999 the GKT School of Biomedical Sciences consolidated largely on the Guy's campus and moved into new facilities. Now for the first time all physiologists are housed on the same campus and all teaching has been integrated. New Hunt's House was built on the site of an outdated Victorian ward block (Hunt's House) and houses the modern Information Services Centre (Library), student computing facilities, teaching laboratories and large and small lecture theatres. The top three floors house state of the science research laboratories and staff rooms. Extensive refurbishment has taken place in the old Guy's Medical School Building (now known as the Hodgkin Building). The old Nurses' Home (Henriette Raphael House) and the Physiotherapy Department (Shepherd's House) have also been refurbished to produce offices for academic and administrative staff, teaching rooms and research laboratories.

The Division of Physiology is one of five divisions (the others are Anatomy, Cell and Human Biology; Biomolecular Sciences; Pharmacology and Therapeutics; and Physiotherapy) making up the School of Biomedical Sciences which, with the School of Medicine and Dentistry of King's College London. The Division plays a major role in the teaching of 360 medical students and 140 dental students each year together with over 300 students in each year of BScs in Biomedical Science courses (including Physiology, Biomedical Sciences and Physiology with Pharmacology). Over 2500 students, of which more than half are medical and dental students, have their base at the Guy's campus. The research expertise of the Division makes a major contribution to third year course units taken by science students and intercalating medical and dental students. Incidentally, over 50% of our medical and over 10% of our dental students intercalate a BSc. A high proportion of these students obtain upper second and first class degrees.

People of the past

The Institutions that have gone into the making of the present College have produced men of distinction in Physiology. C S Sherrington carried out some of his early research on reflexes and was Head of the St Thomas' Department from 1887 to 1895. He left after being ordered by the Treasurer of the Hospital to get rid of his primates, one of which bit the coachman's small daughter who was attempting to play with it. E H Starling graduated in medicine at Guy's in 1889 and three years later became the sole lecturer in Physiology. In the subsequent years he published his hypothesis on the formation of tissue fluid that still forms the basis of our teaching on capillary exchange. His salary was poor and in 1899 he was enticed to the Jodrell Chair at University College where he carried out his work on the heart and on hormones. In more recent times Henry Barcroft held the endowed Sherrington Chair at St Thomas's from 1947 to 1972 and continued his work begun in Belfast on the control of the circulation in human limbs. Much of this work utilised the technique of venous occlusion plethysmography and some of his equipment is in use today in the new Human Physiology research group. The current holder of the Sherrington Chair is Steve McMahon. J N Hunt was Professor of Physiology at Guy's in the 1960s and 70s where he carried out his classic studies on gastric emptying.
There has been a professor of Physiology at King’s College almost from the foundation of the College in 1829. The first professor was Herbert Mayo who demonstrated that sensory and motor nerves leave the spinal cord by separate routes. A series of microscopists then taught physiology, the most notable of whom was William Bowman, famed for his description of the capsule carrying his name. Other early notables were David Ferrier, who showed localisation of function in the cerebral cortex, and F S Locke, who with Ringer developed solutions for perfusing isolated organs and tissues. W D Halliburton and R S J McDowell are two professors who have annual lectures named after them and more importantly the departmental chair was endowed in the name of the former. The last two holders of the Halliburton Chair were Peter Baker who died in 1987 and Peter McNaughton who recently moved to Cambridge. Currently this chair is vacant and we hope to fill it by early next year. At Queen Elizabeth College the last occupant to hold the chair was David Yudilevich and at Chelsea College the last Professor of Physiology was Rainer Goldsmith.

The Present School of Biomedical Sciences and Division of Physiology

Simon Howell, a member of the Division of Physiology, currently heads the School of Biomedical Sciences. The School has 134 academic, 80 technical and 26 administrative staff. Each academic member of the school belongs to one of the five Divisions and is also a member of one of the School’s interdisciplinary research centres or research groups. Research is organised through these research centres and groups where staff are physically located together regardless of their teaching discipline. This has allowed the post-merger School and College to develop a number of centres and groups of potential research excellence. Physiology is represented in almost all of these research centres and groups.

The current research centres and groups are:

- Wolfson Centre for Age-Related Diseases (Director: Leslie Iversen FRS)
- Applied Biomedical Research Group (Head: Di Newham)
- Centre for Cardiovascular Biology and Medicine (Director: Jeremy Pearson)
- MRC Centre for Developmental Neurobiology (Director: Andrew Lumsden FRS)
- Endocrinology and Reproduction Research Group (Co-ordinator: Stuart Milligan)
- Messenger and Signalling Research Group (Co-directors: Alan Gibson and Phillip Moore)
- Randall Centre for Molecular Mechanisms of Cell Function (Director: Bob Simmons FRS)
- Centre for Neuroscience (Director: Stephen McMahon)
- Sackler Institute of Pulmonary Pharmacology (Head: Clive Page)

The current Head of the Division of Physiology is Roger Linden. He succeeded Malcolm Segal, who was previously Head of Division at UMDS, in August this year.

The Division has 33 members of academic staff (8 Professors, 4 Readers, 12 Senior Lecturers and 9 Lecturers). The Division also derives further strength from four Emeritus Professors, who, having retired from other Institutions, continue to carry out research and contribute to teaching within the College.

Innovations in teaching

Medical and dental students both have basic science courses running over two years. This includes about one day per week of professional activities and another day on special study modules. The core material is taught in systems-based modules incorporating the appropriate disciplines. Several members of the division are organisers of systems-based courses and
many contribute to lectures, tutorials and practicals in both years.

We boast a dedicated team involved in the promotion and use of information technology to enhance the student learning experience. David Byrne and Stephanie Cobb work full-time in this sphere with academic support from Jeremy Ward and from Jim McGarrick and Mike Robins who have a special interest in the needs of dental students. Computer Aided Learning (CAL) plays an important part in the curriculum, both as a supplement and in some cases a replacement for traditional lectures and tutorials. A wide range of CAL programs ranging from basic physiological sciences to more advanced clinical topics are available in the Public Access Workstation Suites. Over the last year, the development of a “Virtual Campus” to allow students of all years on the Medical, Dental and Biomedical courses to have access to all timetables, lecture notes and course information has been well received and was commended by both the QAA and the GMC during their visits earlier in the year. Utilising recent advances in world wide web technology, students now have the facility for on-line course selection, tutorials and assessment 24 hours a day on or off campus.

Science courses in all three years are run on a course unit basis with general broad-spectrum units in year 1 through to in-depth research-based units in year 3. An important aspect of the third year is the laboratory-based research project taken by most intercalated and by many of the science students.

King’s College London has run an MSc in Human and Applied Physiology since 1978. For the whole of this time Stella Rowlands has been the course organiser and the present director of the course is John Ernsting, formerly Commandant of the RAF Institute of Aviation Medicine. Students have come with varied backgrounds including sports science, physiology and medicine with a significant number from nursing and physiotherapy. The course acknowledges the unique collaborations with other London colleges and, perhaps more importantly, with MOD establishments at Farnborough, Alverstoke and, more recently, Henlow. Some of the earlier graduates are now teachers on the course.

Our scores in the QAA exercises in February and March 2000 confirm our belief that we organise our teaching well and do so in innovative ways. For our biomedical science courses we obtained 22 points, for medicine 22 and for dentistry a maximum of 24.

Research activities of the Division

As mentioned earlier, members of the Division are also members of a research centre or group and contribute to multidisciplinary studies.

The Wolfson Centre for Age-Related Diseases under the directorship of Les Iversen has brought together the former Neurodegenerative Disease and Antioxidant Research Centres. It will occupy a new building which is at present being built on the Guy’s Campus (with funding from the Wolfson Foundation). The Centre’s current mission is to seek out the cause and mechanisms of cell death in, and to devise effective therapies for, disorders of the central nervous system, including Parkinson’s disease, Alzheimer’s disease and motor neurone disease and other diseases whose prevalence increases with ageing.

The Applied Biomedical Research Group under the headship of Di Newham (Physiotherapy) has a number of members of the Division of Physiology in it. These include John Ernsting who is organising the workshop on Techniques in Human Physiology and Aerospace Medicine; John continues his studies on physiology as applied to aviation problems including hypoxia and pressure breathing. He maintains a close contact with the Centre for
Aviation Medicine and Wing Commander David Gradwell from that Institution plays a major role in teaching for the Diploma of Aviation Medicine that is run within the Division. Fred Imms’ main interests are in the fields of isometric exercise and of responses to orthostatic stress, using a combination of head-up tilt and lower body negative pressure. Chris Smith has produced interesting findings on the effects of drugs on the human vas deferens, which is one of the few healthy human tissues available for research. He also does work on fatigue of human skeletal muscle. Olga Rutherford recently joined the division from St Mary’s via a short stay at Imperial College. Her main research interests centre on the musculoskeletal system in health and disease, particularly with respect to exercise and ageing. Roger Linden continues his work on the function of oral mechanoreceptors and the brain stem reflexes of mastication, in collaboration with colleagues in Dundee Dental School (Sam Cadden, Brendan Scott and Andrew Mason) and Utrecht (Bert van der Glas) and the reflexes of salivation with Nick Hodson (GKT Dental Institute). He has recently completed some studies on angiogenesis of human tooth pulp following orthodontic tooth movement using cell culture techniques in collaboration with Kathy Derringer (GKT Dental Institute) and is currently studying the development of the trigeminal nerve in mouse and ferret embryos in collaboration with Andrew Croydon and Brian Millar (GKT Dental Institute), Malcolm Maden and more recently Adrian Pini (both in the MRC Centre for Developmental Neurobiology). Jane Ward and Mary Forsling with Melanie Rosser and Niall Boyce are investigating circadian and menstrual variations in urine production with particular emphasis on the responses of the kidney to the vasopressin analogue, desmopressin. Anthea Rowlerson studies muscle phenotypes in two different fields. Work on cellular mechanisms of muscle growth in fish is carried out in association with colleagues in Italy. Her interest is not culinary as she is allergic to fish! Work on the masseter muscle is in collaboration with Fraser McDonald in the Dental Institute and colleagues in Lille. The studies involve the analysis of biopsies taken from the masseter muscle during operations to correct facial dysmorphia. They will be assessing the results in relation to the facial deformity and the long term outcome of surgery.

A physiologist, Jeremy Pearson, heads the Centre for Cardiovascular Biology and Medicine. The Centre’s research is organised within four interdisciplinary research groups, each of which contains basic scientists (physiologists, pharmacologists and cell biologists) and academic clinicians studying cell signalling in myocardial ischaemia; endothelial cell dysfunction; vascular biology and inflammation; and the cardiovascular system in pregnancy and development.

The members of the Physiology Division affiliated to the Centre are predominantly associated with the research group studying vascular biology and inflammation, based in New Hunt’s House, which also contains principal investigators from the Pharmacology Division and one from the School of Medicine. Paul Fraser is studying the regulation of cerebral microvascular permeability in vivo, particularly in relation to ischaemia and the roles of bradykinin, cytokines, reactive oxygen species and leukocyte adhesion and transmigration. Giovanni Mann uses mainly in vitro methods to examine mechanisms underlying endothelial and smooth

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muscle cell dysfunction in diseases including diabetes, atherosclerosis and pre-eclampsia. He is currently investigating signalling pathways involved in regulation of nitric oxide production by adenosine and oestrogens, and also the role of oxidant stress in altering these signalling pathways. Ron Jacob, with Anthony Morgan (a British Heart Foundation Fellow), continues to examine the details of Ca\textsuperscript{2+} regulation in endothelial cells using fluorescence imaging and confocal microscopy in collaboration with Kevin Pedley, who in addition studies the translocation of transporters and other cell components, with a major interest in pancreatic islet microvasculature. These interests complement those of Richard Naftalin, whose main research is on control of permeability in the gut, but collaborates on the kinetics and localization of GLUT transporters in vascular cells. Jeremy Pearson is studying intracellular signalling pathways in endothelial cells activated by inflammatory cytokines, with particular interest in the pathways activated in autoimmune vasculitic and connective tissue diseases which lead to increased leukocyte adhesion. Finally, Jeremy Ward has ongoing collaboration with Phil Aaronson (Pharmacology and Therapeutics) using electrophysiological and isolated vessel preparations to understand the specific mechanisms regulating pulmonary vascular tone.

Within the MRC Centre for Developmental Neurobiology, Adrian Pini is involved in the identification of molecules and genes that regulate the survival and direction of axonal growth during development and regeneration.

The Centre for Neuroscience, headed by Steve McMahon, is the largest research centre in the school and is made up of six research groups: Blood-Brain Barrier, Neural Damage and Repair, Neuroendocrinology, Sensory Function, Neuroimmunology, and Neuropharmacology. All but the last two have physiologists in the group.

The Blood-Brain Barrier Group under Joan Abbott and David Begley are investigating the cellular physiology and pharmacology of the brain endothelium and the mechanisms that regulate the permeability of this endothelium to drugs into and out of the nervous system. They have productive collaborations with the pharmaceutical industry and with clinical groups examining disorders of the CNS involving increased permeability of the blood-brain barrier.

The physiologists in the Neural Damage and Repair Group are researching the roles of glial cells and choroid plexus in determining the consequences of diseases and injuries affecting the nervous system. They use a wide range of physiological and cell biological techniques, including electrophysiology, cell culture, calcium imaging, confocal microscopy, immunohistochemistry, in situ hybridisation, RT-PCR, Western blot and gel electrophoresis. Arthur Butt is investigating the functions of glial cells in the developing brain and in the recovery of axonal function following demyelination and degeneration. Sarah Thomas is investigating the passage across the blood-brain and blood CSF barriers of nucleoside analogues used in the treatment of AIDS and in cancer of the brain. David Tonge is investigating regeneration of the nervous system, the influence of neurotrophic factors on neuronal phenotype and nociceptor function, and synapse formation in skeletal muscle. Malcolm Segal and his colleagues are also part of the Neural Damage and Repair Group, and are located on the St Thomas' Campus. They are investigating \( \beta \) amyloid transport by the choroid plexus and its role in Alzheimer's Disease, as well as the coupling of salt and water transport in the formation of CSF.
Mary Forsling is in the Neuroendocrine Group which takes a molecules to man approach. Her studies centre on the modulatory effects of melatonin and gonadal steroids on posterior pituitary function. Models have been developed in rats monitoring both cellular responses of hypothalamic neurones and those of conscious animals. These studies are then continued in humans.

The Sensory Function Group consists of 10 academic staff, with a wide range of technical expertise applied to several neurobiological systems. One of the key interests relates to pain mechanisms and this is the focus of work by Patrick Wall and Steve McMahon, and Steve Thompson, Reg Docherty (Pharmacology and Therapeutics) and Marzia Malcangio. Tom Sears and Malcolm Lidierth use physiological techniques to study sensory-motor integration, while Helen Cox (Pharmacology and Therapeutics) is principally interested in functional properties of the enteric nervous system. Jon Robbins (Pharmacology and Therapeutics) is particularly interested in the membrane properties of retinal ganglion cells.

In the Endocrinology and Reproduction Research Group, Stuart Milligan investigates the control of mammalian reproduction and the biological activities of plant oestrogens. Peter Jones, Shanta Persaud and Simon Howell are interested in the regulation of pancreatic beta-cell function using cell lines from animals or from human organs. This area of research is driven by the clinical importance of diabetes mellitus and most of the work is directed towards understanding normal beta-cell function as a prerequisite to understanding the defects that lead to type 2 diabetes. David Sugden works on the pineal gland and in particular the molecular pharmacology of melatonin receptors and the regulation of pinealocyte gene expression. Barbara Whitehouse investigates factors controlling steroidogenesis in the adrenal cortex.

In addition to the research carried out by members of the Division, we all contribute to undergraduate and postgraduate teaching but particular mention should be made of a dedicated group of teachers who have over the last few years spent a large proportion of their time contributing to the undergraduate teaching and administration, namely: Cedric Demaine, Jim McGarrick, Mike Robins and Timothy Simons.

We hope you enjoy visiting our new and exciting campus at Guy’s and we all look forward to seeing as many of you as possible at both the scientific and social events.

Photograph courtesy of Mark Simon (King’s College London)
Intracellular calcium is a ubiquitous second messenger that controls many aspects of cell function. Its concentration in the cytosolic compartment ([Ca²⁺]i) can change dramatically, rising after stimulation by Ca²⁺-mobilizing agonists from a resting level of ~100 nM to tens of micromolar—an increase of a hundredfold. Both the magnitude of the signal and a complex spatial and temporal compartmentalization of intracellular Ca²⁺ pools, confer selectivity to the calcium signals. However, in addition to their established role as intracellular second messengers, calcium ions can directly affect cell function without crossing the plasma membrane.

Regulation of serum-free ionized calcium
In contrast to the intracellular compartment, serum-free ionized calcium concentration ([Ca²⁺]o) in mammals is maintained within a narrow range, namely 1-2 mM. The near constancy of this parameter emphasizes the sensitivity of cell function to minimal fluctuations in [Ca²⁺]o, as well as the level of sophistication of the homeostatic system regulating [Ca²⁺]o. This homeostasis relies on specific plasma membrane receptors which continuously monitor changes in [Ca²⁺]o. To date, three distinct mechanisms for extracellular calcium sensing have been postulated (5). The first is a 500 kDa protein, belonging to the low density lipoprotein (LDL) receptor superfamily, which is found in parathyroid cells, kidney proximal tubules and placental cytotrophoblasts and whose function remains unclear. The second is a cell-surface type II ryanodine receptor-like molecule, hypothesized to exist at the plasma membrane of certain bone cells, but whose molecular identity is still unknown. The third, and best characterized, is a cell surface, G protein-coupled Ca²⁺(polyvalent cation)-sensing receptor (CaR). This protein was originally identified in bovine parathyroid glands, where its chief function is to modulate parathyroid hormone secretion (1). The receptor belongs to Group II of the metabotropic glutamate receptor (mGluR) superfamily and its secondary structure resembles that of other receptors for peptide hormones (e.g. parathyroid hormone (PTH), calcitonin, vasopressin, etc.), with the only difference being that the physiological ligand is an inorganic ion. Despite the similarities with other members of this class, three main features render the CaR unique (6). First, the receptor is activated by 1-10 mM Ca²⁺, implying an extremely low affinity for its physiological ligand in comparison with other known G protein-coupled receptors. Of course, this low affinity of the CaR for Ca²⁺
is a prerequisite for the central role of the CaR in monitoring changes in serum calcium concentration. Second, the receptor is fairly resistant to desensitization, again an ideal “design feature” given that physiological plasma calcium levels are enough to stimulate the receptor. This implies that, at physiological [Ca$^{2+}$], the receptor is partly active, and exerts a tonic inhibitory effect on circulating PTH levels. Third, biochemical studies have shown that CaR exists in the plasma membrane as a dimer, held together by covalent and non-covalent intermolecular bonds between two receptor molecules.

The key role of the CaR in [Ca$^{2+}$] homeostasis is demonstrated by the observation that mutations of the CaR gene in humans cause hypo- or hypercalcemia of various degrees (6). In all the described mutations, the defect is due to a reduced (inactivating mutations) or enhanced (activating mutations) sensitivity of the CaR to Ca$^{2+}$, rather than to an altered reabsorption of calcium by the gut and/or to an altered urinary-concentrating ability by the kidney.

**Properties of the CaR**

Functional studies have shown that Ca$^{2+}$ is not the only ion which can act as an agonist of the CaR. Other di- and trivalent cations, such as Mg$^{2+}$ and metals of the lanthanide series, endogenous (e.g. spermine and spermidine) and exogenous (e.g. aminoglycoside antibiotics), polyamines and cationic polymers (e.g. polylysine) can all activate the CaR. In addition, reducing ionic strength enhances the sensitivity of the CaR to its agonists (6).

The ion-sensing property of the CaR resides primarily in the large extracellular aminoterminal domain. Overall, the predicted tertiary structure of the CaR is reminiscent of a class of proteins known as the bacterial nutrient periplasmic binding proteins, which “sense” extracellular ligands in the process of chemotaxis or cellular uptake of extracellular nutrients (e.g. amino acids, sugars, ions) (6). From an evolutionary viewpoint, this indicates that the CaR could represent an ancient molecule, possibly resulting from the fusion of a bacterial protein and a serpentine (seven transmembrane spanning) receptor.

Activation of the CaR by extracellular calcium and other cations evokes cell-specific events. As for other G protein-coupled receptors, this can be achieved by complex changes in expression pattern and subcellular distributions of essential signalling elements. In general CaR activation by its agonists triggers phosphoinositide turnover, with consequent Ca$^{2+}$ mobilization and activation of protein kinase C, as well as stimulation of phospholipases A$_2$ and D and of MAP kinase, and inhibition of adenylate cyclase activity (6).

**CaRs outside the extracellular calcium homeostatic system**

In the 7 years since its identification, much has been learned about CaR function in organs involved in the endocrine regulation of [Ca$^{2+}$]$_o$ homeostasis (i.e. parathyroid glands, calcitonin-secreting cells and the kidney). However, we still know rather little about the role of the CaR in organs where there is no obvious link with mineral ion metabolism. Brain, pancreas and eye are just a few of the many examples. In these tissues receptor function has been associated with secretion, control of local ionic homeostasis and programmed cell death (6). It should be noted that the ability of a variety of positively charged compounds to activate the receptor suggests that the physiological agonist of the receptor could be different in different organs. In this regard Conigrave
et al. have recently shown that aromatic L-amino acids are capable of activating the CaR (2). In their experiments, the mixture of amino acids used was chosen to mimic the amino acid composition of fasting human plasma. Thus, given that ligand binding to the CaR is cooperative (Hill coefficient of 2-4), the CaR in the gut could operate either as a Ca\(^{2+}\) sensor, as an L-amino acid sensor or as a sensor for both Ca\(^{2+}\) and L-amino acids (e.g. after a calcium- and protein-containing meal). Considering its widespread distribution, the obvious consequence is that CaR function could be profoundly affected by increased circulating levels of L-amino acids (e.g. after protein ingestion and/or during diseases such as phenylketonuria in the CNS).

**Can CaRs mediate cell-to-cell communication?**

Recent work by Hofer et al. (4) also seems to indicate new avenues in intercellular communication mediated by the CaR. In an elegant series of experiments the authors have shown that, when diffusion from the interstitial space is restricted, changes in [Ca\(^{2+}\)], evoked by Ca\(^{2+}\)-mobilizing hormones (i.e. histamine, serotonin and vasopressin) in a “donor” cell can produce local changes in [Ca\(^{2+}\)]\(_o\) sufficient to stimulate CaRs on adjacent sensor cells. This is because the “donor” cell extrudes a large amount of Ca\(^{2+}\) into the extracellular space during the agonist-evoked [Ca\(^{2+}\)]\(_o\) signal. It remains to be determined whether this mechanism operates in vivo and whether Ca\(^{2+}\) itself, rather than another second messenger, is definitely responsible for the activation of CaRs in sensor cells. However, given the wide distribution of the CaR, the study by Hofer et al. suggests the fascinating hypothesis that epithelial communication can be achieved via [Ca\(^{2+}\)]\(_o\), signals propagating from cell to cell, both intracellularly through gap junctions, and also extracellularly via the CaR. In addition, since activation of the CaR mobilizes Ca\(^{2+}\) from internal stores, the presence of such a mechanism could ensure spatial propagation of the calcium signal and provide a key mechanism for autocrine and/or paracrine regulation of cell function.

**Future avenues**

We are only beginning to understand how cells sense and respond to ionic changes in the extracellular fluids, and a number of issues await clarification. One such issue is the role of the receptor outside the [Ca\(^{2+}\)]\(_o\) homeostatic system, and whether the CaR expressed in organs outside the [Ca\(^{2+}\)]\(_o\) homeostatic system is the same as the parathyroid CaR. A clue that there may be more than one CaR isoform comes from the mouse model of CaR gene knockout. This animal exhibits a solely parathyroid phenotype, which is difficult to reconcile with the widespread distribution of the CaR in tissues other than the parathyroid gland.
There is also the issue of whether the CaR will prove a useful target for modification by drugs. Several chiral amine derivatives (e.g. NPS 467 and 568) have already proved useful as specific CaR agonists or “calcimimetics”, allowing us to test for true CaR activation. However, thus far our understanding of the functional role of the CaR has been limited by the lack of selective CaR antagonists. Recently Gowen et al. (3) have described a compound (NPS 2143) which acts as a selective antagonist of the parathyroid CaR (a so-called “calcylitic”). If this compound is an effective antagonist of the CaR in other tissues, it should prove invaluable in defining CaR function both inside and outside the Ca\(^2+\) homeostatic system.


**AGEING AND MUSIC**

The publication of three recent articles in the Magazine on aspects of ageing suggests that this is a topic of particular interest to Members; one way or another, it affects us all. By contrast, the special feature on “Music and Physiology” (Summer 1995, Number 19) led to almost no published response, and none of the recent “ageing” articles mentioned the role of music. I find it hard to accept that this means it concerns none but a very few physiologists. This letter is an attempt to disprove that hypothesis.

The book “A Good Age”, by Alex Comfort, cited by F. Carswell (Magazine, Summer 2000) said nothing about music in the text but included among the 50 long-lived high-achievers whose portraits are printed, six known for their outstanding musical abilities in their eighth or later decades. One could add more, such as Ralph Vaughan Williams who wrote his 9th Symphony at 80-plus. These cases are impressive – but what have they to do with people like me, who have no more than average musical ability (but love the stuff)? Were they different in kind, or can one trace a continuum in the relevant parameters from us to them? How will ageing affect our own musicality? Can music bring benefits?

I invite any interested readers to write to me and exchange facts and opinions. We might well include relevant major pathologies such as dementias and strokes, and we certainly ought to include the common disabilities of hearing and of motor skills. The exchange might lead to a multi-author report to this Magazine.

Donald Ward and Daniela Riccardi are in the School of Biological Sciences, University of Manchester. Daniela Riccardi will be delivering the Wellcome Prize Lecture on “Cell surface ion-sensing receptors” during the King’s College meeting.
Melville Schachter died in London on May 18, after a long illness, aged 79 years.

Schachter, known to everyone as Mel, studied at McGill University, Montreal and graduated MD in 1946. Mel published his first paper in 1942, whilst still a graduate student of Professor Babkin. It was concerned with the war effort and Mel was charged with investigating whether brain acetylcholine content rose during motion sickness. This was to set the pattern for the rest of his career and, apart from minor excursions into clinical problems, he was a basic biomedical scientist until he retired. Much of his early work concerned the control of gastric acid secretion, work he initiated in 1947 as an assistant professor in the Department of Physiology at Dalhousie University, Nova Scotia. He liked to describe his speciality by the term autopharmacology, coined by Dale, for the study of endogenous pharmacodynamic agents. In 1950 he moved to the National Institute of Medical Research at Mill Hill, London, where he worked both with Wilhelm Feldberg and with Bill Paton, on problems related to histamine, its release and effects of antagonists. After three years he moved to the Lister Institute and then, in 1954, to University College, London as Lecturer, and later Reader, in Physiology. In 1954 he found that wasp venom contained a pre-formed peptide with similar actions to substance DK (lysylbradykinin, kallidin) discovered by Werle in 1937 in Germany and to bradykinin discovered by Rocha e Silva in 1949 in S. America. He persuaded both of these scientists to send him samples and concluded that DK, bradykinin and the wasp venom peptide were virtually identical pharmacologically, coining the name “kinins” for this generic group of peptides. He was to spend the rest of his career studying the actions of this group of peptides, their genesis and removal. While at University College he acted as a consultant to the Parke-Davis Company, working with HOJ Collier on the bronchoconstriction caused by bradykinin. They showed that the effects of the peptide could be antagonised by aspirin. In later life he liked to consider how that observation might have been taken forward, as the whole eicosanoid story unfolded.

In 1965 Mel and his family returned to Canada where he became the Professor and Head of the Department of Physiology at the University of Alberta in Edmonton, a position he retained until his official retirement in 1986. Here he built a strong research and teaching department, concentrating his own researches on the immunohistochemistry of kallikrein. He believed that if it were known where kinins were generated within the body this would provide clues as to their functions.

Mel was a man of very strong views and particularly disliked the idea that individuals could claim any scientific discovery for themselves. Rather he considered, without exception, that all built on what had gone before and each generated new footholds upon which others would climb. He was a great devotee of the Russian geographer, savant, revolutionary and nihilist Peter Kropotkin*, often quoting large pieces of his writings to support an argument he was making. Mel and his wife, Ruth, were generous and kindly hosts, where talk was always fascinating and giving infinite opportunities for further thought after leaving.
After retirement Mel and Ruth returned to London, where Mel continued to work in an honorary capacity, first at University College, London and afterwards in the Department of Pharmacology at King’s College, Chelsea Campus. There he carried on with his research on kinins but increasingly interested himself in the work of young students, giving them the benefit of a lifetime’s experience. His lifetime’s work on kinins was recognised in 1995, at the International Conference on Kinins held in Denver, Colorado, when he was awarded the Frey-Werle Medal, the highest honour in the field. Unfortunately, Mel was not sufficiently well to travel to Denver, so it was received by one of his students, Kanti Bhoola. Kanti read Mel’s acceptance speech with a generous contribution from Kropotkin. As a senior member of the faculty at King’s College said recently “Mel touched the lives of many young researchers who passed through the Department in recent years and we are all saddened by his loss.” The scientific community echoes these sentiments. Mel leaves his wife, Ruth, three children, Marion, Eric and Jonathan and two grandchildren.

Alan W. Cuthbert
Clive Page

*Peter Kropotkin (1842-1931) was born in Moscow into an aristocratic family and subsequently lived in Russia, Switzerland, France, England and the USA, often moving on when his views became unpopular with the authorities. Although Kropotkin criticised Charles Darwin, he was an enthusiast for science and the scientific method, seeing in it a new way of understanding the world empirically, rather than being constrained by traditions, mysticism, and hierarchies. Kropotkin felt that the State and its institutions should be observed, studied, and questioned, not simply accepted: “Anarchism has approached the study of the State exactly in the manner the [scientist] approaches the study of social life among bees, ants and birds”.

“He who first observed that... when the barometer is falling a greater amount of rainfall falls than when it is rising – that man surely made a scientific discovery. But the person who would come after him and assert that the amount of rainfall is measured by the fall of the barometer below its average height – that person would not only talk nonsense, but would prove by his very words that the method of scientific research is absolutely strange to him. Hundreds, if not thousands, of similar relationships are known to science in which we see the dependence of one magnitude upon another; but no [scientist] will presume to affirm the proportionality of these magnitudes without having investigated their [relationship] quantitatively.”

“There is much, very much, in the world that is still unknown to us – much that is dark and incomprehensible; and of such unexplained gaps new ones will always be disclosed as soon as the old ones have been filled up. But we do not know of any domain in which...[natural] phenomena...should prove inadequate to the necessary explanations.” (all Kropotkin, 1903)
This was the first time I had attended any event organised by the Physiological Society. We were accommodated in the Adelphi Hotel (as seen on TV) and our workshop began promptly at 10am. From this point I can only speak with the highest praise. The course ran over two days and was divided into “Ions, force and microscopy” on day one with “Electrophysiology, biochemistry and signalling” on the second.

The speakers had all achieved an understandable, yet worthwhile and interesting pitch. The format for both days was similar with three or four presentations and, in the afternoon, a series of illustrative practical demonstrations. The programme included the use of single cell and intact tissue modalities with sessions relating to intracellular indicators, patch clamping, myography, confocal microscopy, biochemical techniques and nuclear magnetic resonance. The combination of the lecture to convey underlying theory and background with the chance to watch and, in some cases, try such techniques was an excellent means of teaching us the basis for a technique.

We were lucky to have two invited guest lectures, the first from Professor Tom Bolton (St George’s Hospital, London) talking about the role of ions and their channels in smooth muscle contraction. The second came from the newly promoted Professor David Beech (University of Leeds) taking us from the gene to channel function in very small arteries. Both gave a superb insight into their leading edge work.

The workshop was attended by delegates from countries including Spain, France, Greece and Chile, with speakers from a similar range. I think this in itself gives testimony to the effort and expectation afforded to this course. It was a privilege to hear such a range of enthusiastic experts talk about their work. Alongside this, the chance to make contact with other young researchers in similar fields was valuable for friendships and future contacts alike.

In my opinion no-one could rightly expect to leave such a course as an expert in any of the techniques – that was not within the remit of this course. For those who wanted to learn more about subjects they had read about, or visualise ideas they may later be able to apply to their own work, this was a well designed workshop. In an informal debriefing session it seemed unlikely that this would run every year as the potential audience is probably rather small. However, the opportunity for updates every two or three years was mooted and may follow in the future. I am sure I would not be alone in congratulating Professor Wray and her team on a superb workshop.

As a new affiliate I am very impressed by what I have seen and hope that the Physiological Society will continue to add its support to ventures such as these.
On June 17, while most people were enjoying a rare sunny Saturday, 60 physiologists turned up at the Veterinary School Conference Centre at Bristol University to learn about new molecular techniques and how they can be applied to more traditional physiology. The programme was promising with speakers attracted from the USA, Germany and London as well as some eminent locals. Iain Robinson kicked off by telling us about physiological transgenesis in the GRF/GH axis, and was ably followed by Harold Gainer’s approaches to the study of neuronal identity and function using ‘molecular tinkering’. Jim Eberwine gave some useful insights into normal and abnormal neuronal functioning using single cell molecular biology, and Juraj Culman’s possible applications to cardiovascular studies of antisense oligonucleotides were interesting and informative. Both Liang-Fong Wong and Sergey Kasparov did their host institution credit with explanations of somatic gene transfer.

After all this academic excellence about 20 of us retired to a local restaurant to continue the lively debate about the uses of these techniques. A few of us were still discussing such things – or something – during the early hours of the following morning and it is to be hoped that our overseas visitors enjoyed their tour of the attractions of Bristol.

As a scientist but not a trained physiologist two things struck me particularly. First, the speakers were easy to understand and rarely used jargon, and second (from talking to members over coffee) this sort of symposium is extremely important. In a climate where techniques are changing and progressing so fast keeping up can be difficult, and yet not understanding their potential relative to your research could be missing a vital opportunity. Congratulations to the organisers, Bridget Lumb, Julian Paton and David Murphy, for a well-conceived idea and a perfect execution.

Maggie Leggett
“Physiology and Performance” was the title of a Sixth Form Workshop held at Chester College of Higher Education on 29 and 30 June 2000. The workshop was run by physiologists from the Departments of Biology and Physical Education and Sports Science, with content reflecting the areas of strength within those Departments and issues of current interest to ‘A’ level Biology and Sports Science candidates. Fifty-five keen students arrived on campus from schools and colleges in Cheshire, South Manchester, North Wales and Staffordshire. Once everyone had registered and resident delegates had settled into their accommodation, an introduction to the Workshop was presented by Professor David Cotterrell. This was followed by two lead lectures: “Physiological responses to exercise” and “Muscle fibres for performance” which covered the genetics of muscle fibre types. Before lunch, students selected a practical session to join for the afternoon and assembled for the group photo (see below!). The practicals covered a range of ‘A’ level areas to suit differing interests and abilities: estimating body composition (preceded by a short lecture on HIV and AIDS), fitness testing (including an EMG practical using a balance board – see right), and a practical entitled “Measuring stress”, which gave students the opportunity to conduct a biochemical assay. Another group travelled to our partner college at Reaseheath, where the animal unit provided interesting creepy crawlies which were used to learn about receptors! All students met up again for afternoon tea, after which our day delegates returned home. Those staying overnight enjoyed dinner followed by a relaxing boat trip on the River Dee. As the students were under 18, no alcohol was permitted. However, some members of staff were seen to be carrying suspicious bottles of Ribena!

The second day looked at a broader range of physiological issues. The first session, “Mind over matter” was presented by a psychophysiologist and explored the relationships between mental activity and performance. This was followed by useful sessions on Applying to University and Careers in Physiology. After lunch, our postgraduate research students gave short presentations on their areas of work – rates of perceived exertion in children, peripheral vascular disease, investigating heat stress in fire-fighters and assessing “overtraining” in young footballers – interesting for the delegates and good practice for the postgrads! Tea, a brief evaluation session and distribution of certificates of attendance ended a most enjoyable two days. We were very pleased to be joined by Maggie Leggett from the Physiological Society and are most grateful to all our staff and students who supported the event. Lessons learnt? Send invitations early - there is a lot of competition from open days at this time of year!

Kate Irving
Workshop organiser
The challenge

No physiologist can be unaware of the challenges facing our discipline in the post-genomic era and with academic publishing in the electronic age. Clearly The Journal of Physiology has to meet these challenges and achieve the aims stated here. This is not a process that happens in isolation, when members of the Board come together three times a year for Board meetings. Rather it occurs as all of us meet or email and discuss these issues, as the Committee meets, as heads of departments meet, and so forth, and when authors write to complain (or compliment!). The Board is international in nature (around 60% of Editors and two out of four Distributing Editors are non-UK based). Apart from obviously adding their distinguished names and expertise to the Board, the overseas Editors ensure that experiences and developments beyond the UK are available.

The aims of The Journal of Physiology are to:

- publish the highest quality science in all areas of physiology
- provide authors with a fast and fair review and publication process
- be held in high esteem and be the journal of choice for authors
- interact closely with the Physiological Society

The people

At the last AGM 13 new Editors were voted onto the Board –
George Augustine (Durham, NC, USA)
Charles Bourque (Montreal, Canada)
Jack Feldman (Los Angeles, CA, USA)
Vadivel Ganapathy (Augusta, GA, USA)
Thelma Lovick (Birmingham, UK)
Hugh Matthews (Cambridge, UK)
Peter Nathanielsz (Ithaca, NY, USA)
Jens Bo Nielsen (Copenhagen, Denmark)

Ernst Niggli (Bern, Switzerland)
Bernd Nilius (Leuven, Belgium)
Quentin Pittman (Calgary, Canada)
Uwe Proske (Victoria, Australia)
and Brian Robertson (London, UK).

The Board is very grateful to David Eisner, the retiring Chair of the Board. The new Chair is Barry Hirst and I am the Press
The current Distributing Editors are Michael Barish, Michael Gilbey, Yoshihisa Kurachi and Alan North. In addition, Alastair Gibb is responsible for Topical Reviews and Perspectives, Ann Silver, Stephen Lisney, Prem Kumar and Richard Dyball are our Ethical Editors and Michael Rennie is the Statistical Editor. In the Publications Office in Cambridge, Jill Berriman is the Chief Production Editor, Linda Rimmer is the Editorial Assistant with special responsibility to the Board, and Ann Watson is the Senior Distribution Assistant.

The Board is also very grateful for all the expert reviews provided freely by scientists throughout the world. It is through their hard work that delays in providing authors with reports are kept to a minimum. Every year, all Topical Reviews and Perspectives are bound and sent to our expert referees as a token of our appreciation.

Continuing to recruit excellent scientists to The Journal’s Board, helps to maintain the high esteem of The Journal as well as ensuring sound refereeing of submitted papers. The total number of Editors is 58 and they deal with a seemingly ever-increasing number of manuscripts (1406 submitted in 1999). Submissions have doubled over the 10 year period to 1999, and the Board has increased in size to deal with this increase in numbers.

The electronics
The Journal of Physiology has been online since 1997. Both HTML and PDF files are available on the Highwire Press site (http://www.jphysiol.org) which has an email announcement facility. Recently The Journal has made full-text articles freely available 12 months after publication, and there are discussions about making papers available electronically soon after acceptance, via the online service. There is now an electronic manuscript submission system, which is being used by a rapidly expanding number of authors, and authors’ proofs can be sent electronically. These new initiatives should help to reduce publication delays.

All this is good news to readers and authors, and is consistent with our aims of attracting good papers and providing a rapid service to authors.

How much will academic publishing, and specifically the profitability of The Journal, be affected by the drive to ‘free electronic access to all’? Without a crystal ball it is impossible to forecast exactly, but nevertheless plans and discussion involving all Members of the Society, formally and informally, are taking place. What if there is no subscription income from The Journal to the Society in 3 years time? What services do Members want and at what cost? Are page charges or charges for attending meetings inevitable? It is because of the very close link between The Journal and the Society, and the difficult times that may lie ahead for us all, that I raise these matters here.

The good press
To attract good papers, authors need to know that not only will their manuscript be dealt with fairly and rapidly, but that The Journal remains the outlet of choice for their work. This means that they consider that their subject matter is welcomed by The
Journal and that their peers view publication in The Journal as a significant achievement. The Journal remains committed to publishing in all areas of Physiology – thus systems physiology is as welcome as work at the molecular level. We state this to counter misinformation that we are only interested in certain areas!

The Journal of Physiology symposia were initiated in 1999 to raise the profile of The Journal. So far the symposia have been judged to be excellent. Another advantage to the symposia is that speakers are invited to publish a Topical Review in The Journal. Thus a series of linked reviews will appear and act as a useful reference (and citation) source for authors. Citations to The Journal lead to our impact factor value. It benefits the quality of The Journal, via the papers it attracts, if our impact factor remains high compared with our competitor journals. This remains the case and is a continuing challenge to the Board.

Our publishers, Cambridge University Press, also play an important role in promoting The Journal at home and abroad. In particular, Sue Belo from CUP works closely with the Board so that publicity for The Journal is of a high quality and the right people and institutions are targeted. She is present at many Society meetings and Journal symposia and is a good source of promotional material such as pens and post-it pads. CUP also publish The Journal on or before schedule each year. Occupying space within the CUP premises are The Journal production staff and assistants to the Distributing Editors. The Production Editors are May Block, Jonathan Goodchild, Carol Huxley, Alison James, Lynn Jeppesen, Emma Kelly, Pauline Stevenson and Diana Greenslade Jones, with Eleanor Blair as Production Assistant, and the DEs’ assistants are Melanie Parkin, Sharon Upton and Mary Wilson. David Gunn provides computer and electronic expertise. The achievements that The Journal has made to reduce delays from submission to first report and acceptance to publication, and to increase the attractiveness and maintain the high standard of presentation are due to their efforts.

In conclusion, The Journal of Physiology publishes original papers in all areas of physiology, is consistently highly ranked in its field, has no page or submission charges, provides fast review and publication and is attractive with high standards. We have an international Board of Editors and terrific staff in the Cambridge office. For these reasons the Society can be proud of its Journal. There are, however, going to be testing times ahead and it will be interesting to read these last 3 sentences again in 10 years time, and see what changes have occurred!
The final announcement and registration brochure is now available on the Congress Website http://www.iups2001.org.nz

Please visit the website for detailed information on the Congress Programme. Electronic submission of registration and abstracts is preferred and secure facilities for payment by credit card are available online.

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Important Dates:
Already available Electronic registration and submission of abstracts
28 February 2001 Closing date for concessions on registration and abstract handling fees
31 March 2001 Closing date for abstract submission
30 May 2001 Abstracts accessible to registrants at website

Financial support for Members and Affiliates of the Physiological Society
The Physiological Society has set up a fund to support Members and Affiliates needing assistance to attend the IUPS Congress. The application form is available on the Physoc Website, and here in the Magazine page 33. The deadline for the receipt of applications for a grant is 5 January 2001 and no applications received after that date will be considered.

Funds are limited, and we expect to receive more applications than we will be able to support. Each application will be considered individually. Applicants are advised to complete all sections of the form as fully as possible, and to provide copies of any supporting information such as invitations to take part. The maximum award will be £1200, but applicants should show other sources of funding applied for or obtained.

Applicants must submit 6 copies of the application to:
James Relf, Membership Administrator, The Physiological Society, PO Box 11319, London WC1E 7JF.
Membership Agrees New Arrangements for the Admission of Members

The Annual General Meeting in Cambridge on 19 July 2000, voted overwhelmingly in favour of new arrangements for the admission of Members. The new rules came into force immediately, and already we are seeing increasing numbers of applicants who seem to find the new system less intimidating. Existing Members who may be asked to sponsor an applicant, and Affiliates assessing whether they should upgrade their membership need to know how the new system works. A brief description follows.

Who is eligible?
The Committee is using the following guidelines for the selection of candidates.

Group 1: Candidates holding full-time appointments as physiologists at an advanced level in a recognised institution or whose publications are mainly in physiology, including Molecular and Comparative Physiology. The Committee must normally be assured that a candidate intends to remain in the physiological sciences and has either:

- presented a Communication or Demonstration in person to the Society and published one paper on a physiological subject in The Journal of Physiology, Experimental Physiology or another peer reviewed journal, or
- published two papers on physiological topics in The Journal of Physiology, Experimental Physiology or another peer reviewed journal.

Teachers of physiology may, if they wish, substitute a teaching product or products for the papers.

Group 2: Candidates employed in other sciences or in clinical medicine whose publications are largely in journals other than physiological journals. Such candidates would be recommended to the Society only if it were clear that their election would benefit the Society and physiology. Within this group three categories of candidates may be distinguished:

- those who, by their work in institutions other than physiological departments, have made a real contribution to physiology. The normal requirement is that such candidates should have published at least two papers of good quality on physiological subjects and should have given a Communication or Demonstration in person to the Society.
- senior persons. The Committee must be assured that such candidates have a status at least equivalent to that of a Head of Department or a Senior Consultant, have distinguished themselves in their own field, and are interested in physiology.
- directors of groups. In special circumstances, such candidates may be recommended to the Society even though they do not qualify in one of the normal ways, if the Committee is convinced that their election is necessary to enable a number of younger physiologists to maintain contact with the Society.

How to apply for membership
Candidates should obtain an application form by downloading it from our website: www.physoc.org, emailing James Relf at jrelf@physiology.demon.co.uk, or by writing or telephoning the Society.

Applicants need to be sponsored by FOUR existing members of the Society, who must know the applicant and vouch for his or her suitability. Where sponsors are scattered around the globe, photocopies of the original form, signed by different sponsors, are acceptable.

The completed application form with signatures of all four sponsors, three copies of the applicant’s cv, and one passport-sized photograph should be sent to James Relf at the Society.

What happens then?
A Sub-Committee of the Committee inspects all applications closely, checking facts and assessing each candidate against the criteria above. If necessary, further investigations
will be made and questions asked of the applicant. Only when we are confident that we can recommend an applicant for membership, will the name be placed on the Society website. The name will remain there for 28 days and any member of the Society wishing to object to the acceptance of a member should write to the Society giving the reasons for objection. If no objections are received, the member is elected. If an objection is received, the Sub-Committee will reconsider the application in the light of the further information received and if necessary take the matter up with the applicant.

Only once the candidate is accepted does the Society ask for the annual subscription.

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**Annual Subscriptions 2001**

Membership Subscriptions are due for payment on 1 January 2001. We will be issuing invoices based on the new rates shortly before Christmas – if you have not heard from us by mid-January it probably means we do not have an up-to-date address for you so please make contact by phone 020 7631 1459, fax 020 7631 1462 or email: jrelf@physiology.demon.co.uk.

### Rates for 2001

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All Members receive Programmes for Scientific Meetings and Magazines.

**How to Save Money on Your Subscription**

By paying by Direct Debit, you can have an automatic discount of £5 on the above fees and you are saved the inconvenience of writing a cheque and posting it. If you do not already have a Direct Debit arrangement with us, and you have a UK bank account, email James Relf **at once** for the forms, because we must receive your direct debit application form by 4 December if we are to process it for this round of subscriptions.

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**Back issues of The Journal of Physiology**

From time to time the Society is asked if we know of anyone who could make use of sets of back issues of *The Journal of Physiology* or sometimes small ‘libraries’ of academic texts. This kind of offer often comes about when our Members move or retire. If anyone would like to be notified when such an offer is made, or knows of a worthy organisation (overseas perhaps?) who might appreciate sets of back issues, they are invited to email Mary Lewis: mlewis@physiology.demon.co.uk, with details. Since such offers are often ‘time critical’ – the house clearers are at the gate – it would be good to set up a ‘waiting list’ of those who are interested.
The Committee is the Board of Trustees and Directors of the Society. The ballot for members of the Committee took place at the Annual General Meeting in July. Here are the results.

All the Officers who stood for re-election were successful:
- Philip Harson, Treasurer
- Chris Fry, Committee Secretary
- Mark Dunne, Meetings Secretary
- David Brown, International Secretary

The result of the rest of the ballot was:
- Richard Boyd - newly elected Chairman of the Grants Sub-Committee
- Peter McWilliam - newly elected Chairman of the Animal Legislation and Welfare Sub-Committee

Other newly elected members of the Committee are:
- Geraldine Clough, Malcolm Hunter, Prem Kumar and Ron Maughan.
- Bill Winlow (Editor of the Magazine) - re-elected
- Also re-elected were Rob Clarke, Mike Gray, Julian Jack, Thelma Lovick, Giovanni Mann, Geoffrey Smith, Daffyd Walters, Jeremy Ward and Sue Ward.
- Barry Hirst and John Coote, as Chairs of the Editorial Boards of The Journal of Physiology and Experimental Physiology, respectively, also have places on the Committee as does Susan Wray who is Press Secretary of The Journal of Physiology.

Richard Boyd will chair the Committee for the 2000/2001 session.

INTERNATIONAL RELATIONS IN KIEV

The Society’s International Secretary (David Brown, centre) with Professor Platon Kostyuk (Director of the AA Bogomolotz Institute of Physiology, Ukrainian Academy of Sciences) and Dr Elena Lukyanetz (Associate Professor and Scientific Secretary of the Physiological Society workshop) photographed at the Physiological Society’s Workshop for Young Physiologists held in Kiev between September 4 and 8. The workshop was attended by 59 young scientists from Ukraine, Russia (including Siberia), Bulgaria, Slovakia and Georgia. It included seminars by several members of the Physiological Society (SJ Bevan, TB Bolton, DA Brown, DA Eisner, O Garaschuk, AM Gurney, OH Petersen, AV Tepikin, EC Totezu, A Verkhivatsky and S Wray), 16 lab demonstration sessions, and most of the young scientists presented posters of their own work. A full report on the workshop will be given in the next issue of the Magazine.
To: All Ordinary Members of The Physiological Society

NOTICE OF INTENTION TO HOLD AN EXTRAORDINARY GENERAL MEETING

To consider resolutions relating to the Governance of the Society

The Meeting will take place at 12.30 pm on Wednesday 20 December at Kings College London.

An agenda, the resolutions to be considered, an explanation of the reasons for the proposals and a proxy voting form will be posted to all Members eligible to vote by 14 November 2000.

C H Fry, M J Dunne
Secretaries

THE FUTURE FOR THE PHYSIOLOGICAL SOCIETY

Regular readers of The Magazine may have seen the reports of the work of the Governance Working Party which has been considering the way the Society organises itself and in particular the decision making structures and the democratic process.

After much careful consideration, the Committee of the Society is recommending a number of changes to the existing structure. These proposals require endorsement by our members before they can be implemented and an Extraordinary General Meeting is being called to discuss and vote on them. The EGM will take place at King’s College London, on Wednesday 20 December at 12.30 pm. Ordinary Members are entitled to vote either in person or by registering a proxy vote. Full details, including the resolutions on which members will be asked to vote and the new draft Articles of Association and Domestic Rules, will be sent to Members in mid-November.

The Committee is proposing the following changes:

◆ A new appointment of President: to represent the Society nationally and internationally, and take an important part in representing the views of physiologists to government and among our sister societies.

◆ The Committee of Directors/Trustees to be renamed the ‘Council’ with a remit to focus on strategic issues. The number of Council Members nominated by the membership will increase from 13 to 20. The electoral process will be simplified and made positive (members vote for their favoured candidates, rather than striking out those they do not want). In addition, two non-voting places will be reserved for Affiliates.

◆ There will be an Executive Committee made up of members of the Council, and comprising a chairman, a deputy chairman, a treasurer, a meetings secretary, and an international secretary together with the President and a member of the Editorial Board of The Journal of Physiology. The Executive Committee will be answerable to the Council and have a clear remit to oversee the day-to-day operations of the Society.

The Committee believes that introducing a two-tier structure will help the Society become more responsive to the challenges facing physiology today and urges Members to vote in favour of the proposals.
The Future for The Physiological Society

The proposed structure

**Membership**
- Nominates 20 Members of the Council

**Council**
- Nominates 5 Members of the Council
- Elects a President
- The Editorial Board of The Journal of Physiology elects a Member of the Council

**Council**
- 27 Members and 2 Affiliates
- Responsible for determining the strategic direction of the Society

**Affiliates**
- Nominate representatives to attend Council

**Affiliates**
- Elect 2 representatives to attend Council

**Council**
- Elects the Executive Committee

**The Executive Committee**
- 7 Members:
  - The Chairman (elected by the Council)
  - Deputy Chairman (elected by the Council)
  - Treasurer (elected by the Council)
  - Meetings Secretary (elected by the Council)
  - International Secretary (elected by the Council)
  - The President (ex officio)
  - Member elected by *The Journal of Physiology* (ex officio)
- Responsible for overseeing the day to day operation of the Society
Cardiovascular and Respiratory Control

The Cardiovascular/Respiratory Control session at the Aberdeen Meeting in September went well, as it always does when we visit north of the border. There were 16 oral communications and 9 posters presented. In addition we were lucky to have a wonderful Designated Lecture half-way through the session. The large audience enjoyed some new insights into central chemosensitivity which were presented in an entertaining way by Professor Eugene Nattie from Dartmouth Medical School (USA). Once again our session spanned two days with the Society dinner in between (I really must do something about that!).

As far as future plans go, our next designated session is scheduled for Oxford in March 2001. In collaboration with Dr Stuart Egginton of the Comparative Physiology SIG, we are organising a one day symposium at that meeting entitled ‘Vagal control – from axolotl to man’. This particular topic has been chosen to bring together the interests of the Comparative Physiology and Cardiovascular/Respiratory Control Special Interest Groups, as the interests of the two groups overlap enormously and there is much to learn from each other. Our intention is to represent all aspects of vagal control and to deal with the topic in a phylogenetic way, as the title of the symposium suggests. Keep an eye out on the Society website for further information about speakers involved and topics to be covered. At the same meeting there is a symposium entitled ‘Development and Plasticity of Respiratory Control’, which should be of interest to many people in our SIG as well. So there is plenty to entice you to go to Oxford in the Spring!

As always I end with a plea for any suggestions for symposia, Designated Lecturers or any other events that the SIG can help with. See you at Oxford!

Teresa Thomas

Neuroendocrinology

The Group has had a busy year with the successful meeting at Imperial College and what promises to be an exciting meeting at King’s College. Hopefully members of the Group will have enough energy to submit work for the designated session at Oxford next year. Ideally, we would like to have had this session later in the year, but the full calendar of events with a neuroendocrine input, not to mention the IUPS Congress, made this difficult. A lecture on leptins and food intake is planned, so anyone working in this area is encouraged to submit an abstract, but the deadline of 7 December is nearly with us. The session is also registered for the Pfizer Prize. There has been a poor response on previous occasions, so please get nomination forms from the Meetings Secretary’s Office and encourage your PhD students to submit abstracts for this meeting. Ideas for symposia on ‘hot topics’ are always welcome, so if you have any suggestions, please put pen to paper or tap them out on your keyboard and send them to me.

Mary L Forsling

Comparative Physiology

I hope the busy summer season of conferences/fieldwork proved to be productive for everyone. Experimental Biology 2000 went well, and suggestions for topics suitable for a joint session with our colleagues in the SEB would be welcomed. I look forward to seeing as many as possible for the annual SIG meeting at King’s College London; please make the effort to present a talk or poster, and ‘encourage’ students to make the leap into the public arena. You are all invited to join us for the first joint symposium at Oxford (19-21 March 2001), organised with Teresa Thomas of the Cardiovascular/Respiratory Control SIG. I am also arranging a Distinguished Lecturer for the Comparative designated session, so it should be worth the trip!

Stuart Egginton
**Ion Channels**

Professor Stuart Cull-Candy from University College London will be delivering the Ion Channels Designated Lecture at the King’s Meeting in December on the ‘Role of Glutamate Receptor Subunits in Central Synaptic Transmission’.

David Beech (Leeds) and Hugh Pearson (Leeds) are to be the new Convenors for the Ion Channels Special Interest Group. There will be a short business meeting during the Group’s designated session at the King’s College Meeting to formalise the hand-over. Our thanks go to Jon Robbins and Reggie Docherty for maintaining the Group over the last few years.

Contact details:
Prof D.J. Beech  
School of Biomedical Sciences  
Worsley Building, Level 9  
University of Leeds  
Leeds LS2 9JT  
Tel: 0113 233 4323  
Fax: 0113 233 4331  
Email: d.j.beech@leeds.ac.uk

Dr H.A. Pearson  
School of Biomedical Sciences  
Worsley Building, Level 9  
University of Leeds  
Leeds LS2 9JT  
Tel: 0113 233 4322  
Fax: 0113 233 4331  
Email: h.a.pearson@leeds.ac.uk

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**Somatosensory Physiology**

The Somatosensory Physiology Special Interest Group has designated sessions at Oxford and Bristol in 2001. The Group is also joining forces with the Sensory Functions SIG to hold a joint symposium at the Bristol Meeting on “Stimulus Transduction in the Auditory, Visual and Somatosensory Systems”. Pfizer rounds will be in operation for both these SIGs at Bristol.

For further details email at: lucy.donaldson@bristol.ac.uk.

_Lucy Donaldson_

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**Autonomic Function**

Jim and Sue Deuchars (Leeds) have agreed to take on the Convenorship of the Autonomic Function Special Interest Group. If you would like to be informed by email about SIG activities, please email your details to Jim Deuchars at j.deuchars@leeds.ac.uk.

Contact details:
Dr J. Deuchars and Dr S.A. Deuchars  
School of Biomedical Sciences  
Worsley Building  
University of Leeds  
Leeds LS2 9NQ  
Tel: 0113 233 4249  
Fax: 0113 233 4228  
Email: j.deuchars@leeds.ac.uk  
s.a.deuchars@leeds.ac.uk
Physiological Determinants of Exercise Tolerance in Humans
BJ Whipp, St. George’s Hospital Medical School, London and AJ Sargeant, Manchester Metropolitan University, UK

This book is designed to confront the challenges of identifying the causes of exercise intolerance, i.e. what causes an individual to be unable to sustain a particular work rate sufficiently long enough for the successful completion of the task.

The strength of this book lies in its integrative approach. That is, there is a logical progression from considerations of individual organ system responses to their interaction in constraining or limiting exercise tolerance, and how this may be influenced by physical training. In this context, the book considers the following issues: skeletal muscle mechanics; the control of intramuscular energetics and tissue gas exchange; circulatory and cardiovascular system function; and pulmonary limitations.

Neural Control of Skilled Human Movements
FWJ Cody, University of Manchester, UK

This textbook focuses on skilled movements in man, while drawing upon vital evidence obtained in other species. Attention is mainly directed at movements of the hand and arm, which have been studied most fully. The production of speech sounds is considered as another important example of skilled movement. Concise up-dates of current understanding of the roles of the main motor centres - cerebral cortex, basal ganglia, cerebellum and spinal cord - in skilled movement and its clinical impairments, are provided by a group of neuroscientists renowned for their research expertise and

Cardiovascular Regulation
D Jordan, Royal Free Hospital Medical School and JM Marshall, University of Birmingham Medical School, UK

Cardiovascular Regulation provides an account of our current understanding of the control of the cardiovascular system. Each chapter has numerous summary boxes and also ‘Essential Reading’ suggestions for additional reading for undergraduates and ‘Further Reading’ suggestions to cover the subject to postgraduate level.

“This book is recommended for any researcher interested in the intricate mechanisms involved in the regulation of cardiovascular function.”
Journal of Medicinal Chemistry

The Pathophysiology of the Gut and Airways
An Introduction
PLR Andrews and JG Widdicombe, St. George’s Hospital Medical School, London, UK

This book examines the pathophysiological basis of a number of relatively common clinical problems of the gut and airways. These two systems share many similar physiological features which are

Full details at: www.portlandpress.com/books/
FIRST WORLD CONGRESS ON THE FETAL ORIGINS OF ADULT DISEASE
2 – 4 February 2001
The Oberoi Towers, Mumbai
Organisers: MRC Environmental Epidemiology Unit, University of Southampton, UK
Sneha-India and The International Council for research into The Fetal Origins of Adult Disease

Contact Details: Mrs Jane Pearce
Tel: 023 8077 7624 / Fax: 023 8070 4021
E-mail: jp@mrc.soton.ac.uk
Website: www.sneha-india.org

Epidemiological studies repeatedly show that poor fetal growth and small size at birth are associated with increased risk of coronary heart disease, stroke, hypertension and Type 2 diabetes in adult life. Studies also link fetal growth with adult neurological disorders, hormone-related cancers, asthma, osteoporosis and advanced ageing.

The fetal origins of adult disease is now an established area of research which is shedding new light on the pathophysiology of disease. The First World Congress will bring together, for the first time, nutritionists, clinicians, basic scientists and policy-makers working in this field. Speakers will discuss findings linking size at birth with disease, the nutrition and endocrine control of fetal growth, the role of placental function and maternal nutrition and ecological and evolutionary aspects. On the final day International Agency representatives will address the implications of this research for strategies to prevent chronic disease.

You can ask to be added to the mailing list by filling in the ‘Yes I am interested’ form on our website: www.sneha-india.org

TECHNIQUES WORKSHOPS
These workshops are designed for researchers to gain hands-on experience and/or to learn research techniques new to the participants. They are subsidised by the Society and there are limited places for each. Application forms are available on the website or from Maggie Leggett and should be forwarded straight to the host organiser from whom further details may be obtained. Workshops planned this year:

Leeds – 28 November (Drs Kemp and Peers, see separate advertisement) **
Kings’ College – 18 December (Professor Ernsting, see separate advertisement) **

YOUNG PHYSIOLOGISTS’ SYMPOSIA
These are symposia organised, chaired and attended by young physiologists. They are sponsored by the Society. Application forms and further details are available from Maggie Leggett or the host organiser. This year we have the following symposia:

Oxford – 16/17 December (Dr Peter Kohl, see separate advertisement) *
Dundee – January 2001 (Dr Stuart Wilson, see separate advertisement) *
Southampton – 22 May 2001 (Dr Dean Brown, see separate advertisement) *

PRACTICALS
Pressure breathing: subjective, cardiovascular and respiratory responses to continuous positive pressure breathing at pressures up to 60 mmHg.

Gravitational stress: the cardiovascular responses including cerebral blood flow to combined passive head-up tilt and lower body negative pressure.

Controlled hyperventilation: the effects of controlled hyperventilation on body stores of carbon dioxide, the cardiovascular system and psychomotor performance.

Brief Profound hypoxia: the respiratory and cardiovascular effects of brief profound hypoxia induced by breathing nitrogen.

Cardiopulmonary reflex responses to LBNP: the assessment of cardiopulmonary reflexes by monitoring responses of central venous pressure (using Gauer technique) and forearm vascular resistance (using Whitney technique) to suction applied to the lower body.

Muscle fatigue: the effect of muscle fatigue on force, power output, voluntary activation and contractile properties of the quadriceps muscle group.

Number of students
Each practical will accommodate 4-5 students, will take approximately one and a half hours and will be repeated four times in the day. We propose that each student participates in four practicals. The maximum number of students who can be accommodated will therefore be thirty.

John Ernsting
Workshop Organiser

MEETING OF THE PHYSIOLOGICAL SOCIETY AT KING’S COLLEGE LONDON
18-20 December 2000
Workshop on Research Techniques in Human and Aerospace Physiology 18 December 2000

FACULTY: Professor John Ernsting, Mr Simon Evetts, Wing Commander David Gradwell, Dr Fred Imms, Squadron Leader David McLoughlin, Dr Olga Rutherford

Please note that while members are welcome to advertise relevant events in the Magazine and on the website, advertisements via email will be restricted to events sponsored by the Society.
Physiological Society Young Physiologists’ Symposium
THE EXCITEMENT OF EXCITABLE CELLS
University Laboratory of Physiology, Oxford, 16 – 17 December, 2000

The Oxford Young Physiologists’ Symposium will provide a focus for 40 young scientists working on the physiology of excitable cells to meet and discuss their research, to further their experience in scientific presentation, and to talk to some of the field’s most eminent figures. All participants are expected to actively contribute to the symposium by submitting a one page proceedings paper for circulation at the Symposium, and by giving an oral communication in the trusted 10+5 min. format of the Physiological Society. Keynote lectures will be given by Professors Denis Noble and Colin Blakemore, University Laboratory of Physiology, Oxford. Furthermore, Leica Microscopic Systems will run a half-day microscopy workshop (including confocal microscopy) exclusively for participants of the Meeting.

The Symposium will run for two whole days (Saturday and Sunday), and attendees are requested to arrange their travel accordingly. It precedes the King’s College Meeting of the Physiological Society, and participants are encouraged to proceed on to the London Meeting.

Registration for the Symposium, meals and social functions are free of charge. We also offer free college accommodation to participants from outside Oxford (including Friday and Sunday nights when required). However places are limited and priority will be given to graduate students and young post-doctoral students who
i) work in the area
ii) submit a proceedings paper of good scientific content (format: title, authors and affiliation, introduction, methods, results, conclusion, references, presenting author’s email address), and
iii) commit themselves to attend the whole meeting.

Applications (forms will shortly be available on the Physiological Society’s website) should be submitted to the Oxford organisers a.s.a.p., but not later than 18 September 2000. Successful applicants will be notified by the 1st October 2000.

For more information on the symposium please contact Mr Neil Herring (neil.herring@physiol.ox.ac.uk).

More detail about the involved Oxford research groups can be found on the web pages of the Physiology Laboratory (http://www.physiol.ox.ac.uk/) and the MacDonald-Pew Centre for Neuroscience (http://www.cogneuro.ox.ac.uk/).

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ELECTRONIC SUBMISSION TO THE JOURNAL OF PHYSIOLOGY

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

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UKLSC CAREERS CONFERENCES

These conferences are the only life science careers days currently available, and are organised by The Physiological Society in conjunction with The Biochemical Society, The British Society for Immunology, The Society for General Microbiology and The British Pharmacological Society. There are sessions for undergraduates and postgraduates on a range of careers including research, teaching, science communication, technology transfer, clinical careers and patent law as well as advice on interview technique and CV preparation. Representatives from many large companies will be present and there will be CV workshops. The cost is likely to be £7 per person inclusive of lunch. Posters will be mailed to departments and further information is available on the website. Dates and places for this year are:

UMIST – 18 November
Queen Mary and Westfield College, London – 2 December

If you would be available for part of the day to assist on The Society stand and answer enquiries from delegates please contact Maggie Leggett. (mleggett@physiology.demon.co.uk)**

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Physiological Society Young Physiologists’ Symposium
ENDOTHELIAL CELLS – ‘THE ULTIMATE INTERFACE’?

University of Southampton
22nd May 2001

The aim of this one day symposium is to bring together young scientists from a wide range of research backgrounds who share a common interest in the biology of endothelial cells and their functional role at the blood–tissue interface.

The symposium will provide graduate students, PhD students and postdoctoral researchers with the opportunity to present and discuss their research in an informal and friendly atmosphere, and to forge new links with other young scientists in the field. We plan an integrated physiological symposium and therefore welcome a broad range of scientists to participate with backgrounds including physiology, pharmacology, immunology, biochemistry and molecular biology.

All delegates will be expected to contribute to the meeting by presenting an oral communication (10 min + 5 min discussion time) or poster. A prize will be given for the best oral communication and the best poster. The meeting will finish with a lecture by Professor Tom MacDonald, University of Southampton.

There is no fee to register for the meeting, and no charge for the symposium dinner in Ocean Village. Places are limited and will be allocated on a first-come-first-served basis.

Email Dr Dean Brown (dwbl@soton.ac.uk) for further details and a registration form. Deadline for registration and receipt of abstracts is 31st March 2001. Successful applicants will be notified by mid-April 2001.**
The aims of the workshop are:

• To increase the understanding of large vessel geometry and flow

The geometry of large vessels substantially determines the blood flow field within them. This, in turn, markedly influences their biology and the development of disease. It has been usual practice to model the geometry of large vessels as planar and the associated flow as axisymmetric or symmetrical about a plane of curvature. The geometry of large vessels is, however, commonly non-planar and the associated flow is asymmetric. As recently recognised, there may be, in consequence, important effects on vascular biology and disease. The aims of the workshop are:

• To increase the understanding of large vessel geometry and flow
To consider recent advances in understanding of the effects of large vessel geometry and flow on vascular biology and pathology, including the implications for vascular interventions such as bypass grafts.

The two-day programme will consist of six keynote lectures and a series of five invited discussion groups supplemented by poster presentations. Places will be strictly limited and a small charge to cover the conference dinner, lunch and refreshments will be made.

Further details from the Conference Secretary, Gill Cash – Email: g.cash@ic.ac.uk*

ARE YOU AN EXPERT WITNESS?

The UK Register of Expert Witnesses is always pleased to hear from suitably qualified specialists in any field who wish to make known their availability as expert witnesses to a wider circle of solicitors, barristers, trading standards officers, and insurance companies. Preparations for the 14th edition will soon be underway, so time is of the essence. To find our how to become listed in the UK Register of Expert Witnesses, contact Louise Thompson at

J S Publications
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fax 01638 560924
tel 01638 561590
e-mail louise@jspubs.com

Scientific Apparatus Recycling Scheme

The aim is to take reliable apparatus and scientific journals donated by active laboratories as surplus to requirements and transfer it to laboratories in countries which are less well equipped and which have problems acquiring research materials at current prices. The collected apparatus, refurbished if necessary, is offered at regular intervals via lists sent to FEBS Constituent Societies. Orders for items in these catalogues are dispatched free of charge in batches to the Societies concerned. Since 1992, batches of equipment and journals have been sent to Hungary (three times), Poland (twice), Romania (three times), Lithuania, Bulgaria, Czech Republic, Latvia, Ukraine and Russia.

Some items which are not in demand by European countries have been sent with financial support from the Nuffield Foundation to African countries.

Offers of donations and information on current holdings can be obtained from

P N Campbell, SARS, Department of Biochemistry and Molecular Biology, UCL, Gower Street, London WC1E 6BT, UK.

Tel +44 (0) 20 7679 2169; Fax +44 (0) 20 7679 7193 or email campbell@biochemistry.ucl.ac.uk.
**Physiological Society Travel Grant Application Form**

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**At the meeting:**

- Do you intend to submit a poster? yes/no
- Are you invited to take part in a Congress Synthesium? yes/no

**Title of abstract**

**Funding**

Funding applied for from the Society £

*(note each application will be considered individually and funds are limited. The maximum award will be £1200).*

**Other sources of funds**

Please give details of other bodies to which you have applied or intend to apply for support, including maximum award and date of notification.

**Details of employment or status**

(please tick boxes as appropriate)

- Appointment/status
- Employer/funding body
- Member of UK/Irish department of Physiology or related sciences
- Graduate
- Post doctorate worker
- Academic staff member
- Technical staff member
- Visitor
- NHS clinician not part of a medical school
- Member of MRC, other UK research institute or equivalent

**Membership of The Physiological Society**

(please tick one box)

- Member
- Affiliate
- Candidate for membership

**Membership number**

Funds are available towards the cost of physiologists wishing to attend the meeting to present their work. The sum available is variable, but the maximum award will be £1200. Applicants should also pursue other sources of funding.

**Deadline for receipts of applications:**

Friday 5 January 2001

Submit six (6) copies of this form to

James Relf, Membership Administrator,
The Physiological Society,
PO Box 11319, London WC1E 7JF

*PLEASE TURN OVER*
Physiological Society Travel Grant Application Form cont’d

Summary of abstract: please summarise, in not more than 250 words, the paper or poster you plan to present at the Congress, including co-authors. Give the name of the presenter.

Note here any additional scientific purposes for your visit to New Zealand: e.g. attendance at other meetings, visits to laboratories, collaborations etc. Please supply copies of supporting documents, such as invitations, where relevant.

If you are awarded a grant we would like to transfer the funds directly into your bank/building society account. Please complete the following:

Bank/Building Society
Name of account holder(s)
Account number
Sort code
View of New Hunt's House through the colonnade

Gordon Museum

View of the campus from Shepherd's House

The colonnade of old Guy's Hospital

Back cover photograph: statue of Mr Thomas Guy