

*The*

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*Physiological*

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*Society*

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*Magazine*



**Winter 1994**

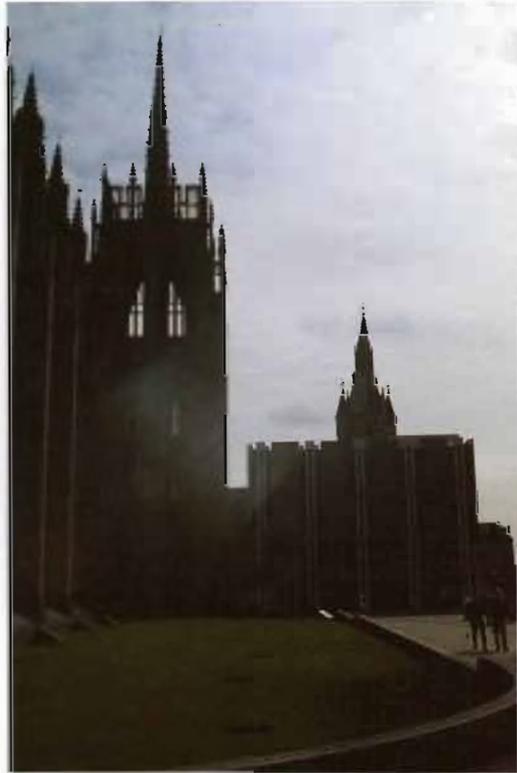
**No 17**

# The Aberdeen Meeting

*King's College, Aberdeen, where the Meeting was held*



*Marischal College, Aberdeen, home of the host department*



*The Fraser Noble Building, main venue for the Meeting*

*Photography by Saffron Whitehead*

*Professor Cecil Kidd, (left), head of the host department, with Professor John Severinghaus, who delivered the first Paton Prize Lecture*

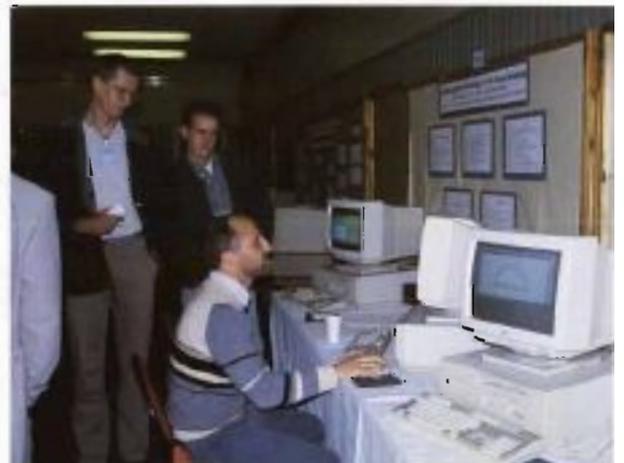


*What was the Mystery Object displayed at the Aberdeen Meeting? Turn to page 17 to find out*

*Computer aided learning Demonstration*



*Photograph kindly supplied by David Exton, Science Museum*



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## Action Points

- Affiliate Travel Grant Scheme** The next two deadlines for receipt applications are 30 November 1994 and 31 January 1995.
- Committee Nominations** Suggestions for new Committee members should reach the Committee Secretary by the end of January.
- Corporate Membership** Views and comments on the article on Corporate Membership should reach the Treasurer by 14 January 1995.
- Eastern European and Third World Grants** The next two deadlines for receipt applications are 30 November 1994 and 31 January 1995.
- Foreign Membership** Members wishing to express their views (see page 4) should write to the Committee Secretary by 1 January 1995.
- Joint Meetings in Japan and Korea** Abstracts should be submitted to the **Administration Office in Oxford** between 19 and 29 December 1994.
- Keele Meeting** Abstracts should be submitted to the Meetings Secretary between 16 and 26 January 1995.
- Magazine** Letters and articles for inclusion in the next issue should reach the Editor by **6 January 1995**. Advertisements and items for the Committee News, Special Interest Group Forum Noticeboard sections should reach the Administration Office by 31 January 1995.
- Membership Subscriptions** Annual Membership subscriptions for 1995 are due on 1 January 1995. A notice of the 1995 rates is circulated with this *Magazine*. Members who have not completed direct debiting instructions should ensure that their payments reach the Administration Office in January.
- MSc Bursaries** The next deadline for receipt of applications is 30 November 1994.
- New Lecturers Support Scheme** The next deadline for receipt of applications is 31 March 1995.
- Paton Prize Bursaries** The deadline for receipt of applications is 31 January 1995.
- Vacation Studentships** The closing date for receipt of applications for the summer of 1995 is 31 March 1995.

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## GUIDELINES FOR CONTRIBUTORS

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

### Format of articles

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

### Length of articles

This will be determined by the subject matter and agreed between the contributor and the commissioning editor. Articles will vary in length from 200 words to a maximum of 800 words.

### Submission of articles

**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 re-typing. When disks are submitted, it is helpful to give brief details of the computer, operating system and software package(s) used (DOS formatted Wordperfect 5.1 files preferred, but not essential).

### Deadlines for submission

If in doubt, see Schedule of Meetings Publications Deadlines for 1995 or contact the Editorial & Production Office. Late submissions will not be accepted or publication will be deferred to a later issue.

### Illustrations

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

### Suggestions for articles

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

### Magazine Editorial Group

Saffron Whitehead ..... *News from Abroad, Letters*  
Phil Harrison ..... *Science News & Views*  
Malcolm Segal ..... *Teaching & Technology*  
Laurence Smaje ..... *Policies & Politics*  
Tilli Tansey ..... *Traces of the Past*  
Susan Wray ..... *Special Features*  
Valerie Cox ..... *Young Physiologists*  
Heather Dalitz ..... *Committee News, Special Interest*  
*Group Forum, Notices & Advertising*

## PHYSIOLOGY AT BIRMINGHAM

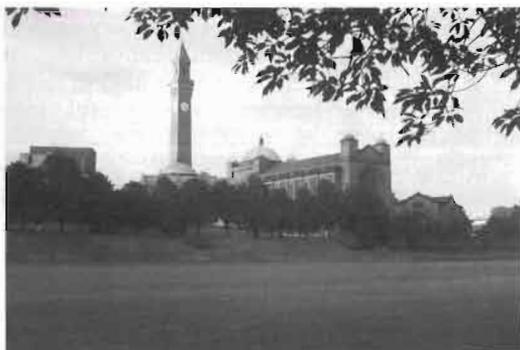


It hardly seems four years since the Society visited Birmingham and much has happened to us in that time. After a brief flirtation with a School of Basic Medical Sciences, of which I was head, we are now back in a School of Medicine which, although large, allows more ambitious strategies.

During this period the Department has increased its research activities and teaching programmes, inevitably giving rise to feelings of overload. Despite this, the 15 lecturing staff remain happy if not content. On this basis we have worked to build a large research establishment which thrives despite losing two of our international stars: Professor Peter Rack, who retired in September 1993 and who sadly died in a freak accident while walking in the Lakes this summer, and Professor Olga Hudlicka, who retired in December 1993 but continues to run an active research group in the Department. This year Steve Logan, who had recently been awarded a chair in Neuroscience with us, was persuaded to move to a similar chair in Aberdeen, which is an exciting and important opportunity for him but a great loss to us. Nonetheless, the total number of people engaged in research is close to 100, including 30 postdoctoral workers and research visitors, 21 technicians (12 UFC) and 30 graduate students. Our research income has continued to oscillate around £1.5 million per annum and we can expect this to rise with our initiatives in neuroscience, for which a chair has been recently advertised, and new developments in cardiovascular science.

### The Beginnings of Physiology in Birmingham

All this is a far cry from the early days of the Medical School here in Birmingham. Physiology was first taught to students of medicine in Birmingham in 1825 when the surgeon and anatomist Mr Sands Cox, FRS established a medical school here. It became part of Queen's College, which received its Charter from Queen Victoria in 1843 when it was hoped that Departments of Science, Arts and Medicine would go on to become the main centre of higher education in the Midlands. This never materialised because of a conflict which developed over the independence of the Faculties of Science, Theology and Medicine - many of the arguments seeming uncomfortably close to those we have today about devolved budgeting.



The Medical School at Birmingham today

Badly in debt, the Medical School was absorbed into Mason College in 1880, a rival, more secular establishment founded by Josiah Mason, a carpet weaver's son from Kidderminster, who had prospered by the manufacture of split rings and steel pens. It was here the first Chair in Physiology (1881) was held by John Haycroft, the discoverer of Hirudin, the anticoagulant produced by the leech salivary gland. Josiah Mason epitomises the social instincts which developed in those who had made good out of the industrial revolution in the Midlands. He founded an orphanage whose children were given preference for admission to the College. Mason College became the University of Birmingham in 1900, following much campaigning by Joseph Chamberlain and others.

### The Lunar Society

The tradition of physiology in Birmingham though goes back much further than this brief history indicates. During the 18th century, when manufacturing industries were mushrooming in the Midlands and changing the world outside, there was a remarkable confluence of genius and originality amongst individuals captured by the excitement of the time and many of whom met together regularly in Birmingham as the Lunar Society (so called because they met monthly on the night of a full moon). One constant attendant of the Lunar Society was William Withering, physician at the General Hospital in Birmingham's centre and distinguished chemist and botanist. Withering noted the action of foxglove on the heart and as a diuretic and it was from this work that the use of foxglove or the active principle digitalis dates.

It was at the Lunar Society that Withering met with a whole range of eminent thinkers and doers of the day, such men as Matthew Boulton, manufacturer and great at putting ideas into practical use, Erasmus Darwin, Galton, Josiah Wedgwood, James Watt and Joseph Priestley and other kindred spirits (echoes of foresight here). Priestley was remarkable even in this group - discoverer of oxygen as well as several other chemicals, first to synthesise water and perhaps to understand the exchange of oxygen and carbon dioxide in the lungs.

### Continuing Traditions

I like to think that our present initiatives and strengths in cardiorespiratory science continue this great tradition of Withering, Priestley, Haycroft and, more recently, I de Burgh Daly (1927-33). We established a few years ago a cardiovascular respiratory control group greatly strengthening links between this Department and others, most notably Comparative Physiology in the School of Biological Sciences, Sports & Exercise Sciences and Cardiovascular Medicine. This group is directed by myself and Professor Pat Butler in Biological Sciences, although the main organisation is managed by Dr Janice Marshall and Professor Ted Taylor. The research in this group covers a wide range of topics but they come broadly under the headings of how the brain controls the heart, blood vessels and airways, and local and nervous regulation of the heart and peripheral vasculature.



A view of the University of Birmingham

The Department is fortunate to have retained a good balance of academic staff throughout much of the range of physiology. However, work in the Department can still be divided into three main areas: cardiovascular respiratory science, neuroscience and renal science. In each of these areas programmes of research are pursued at the cellular level, systems level and up to the whole animal and human level. Neuroscience has been strengthened by the recent appointment of Dr Emil Toescu, who has been working with Professor Ole Petersen in Liverpool. It is Emil's intention to study  $Ca^{2+}$  signalling in neurones. We are further strengthening cellular neuroscience by appointments to chairs in this Department and in Pharmacology. We are fortunate to have two very strong groups in renal science, each ably led by Edward Johns and Chris Lote. It has been pleasing that grouping has not led to insularity for there is still a high level of collaboration and interaction between labs.

A major objective in teaching has been to establish a BMedSc honours degree course which now takes 45 students. This course is unique insofar as the modules are drawn from faculty-wide specialties to include both clinical and basic medical sciences. An important initiative is in computer based learning, where David Davies has some very novel and exciting approaches which he will demonstrate to the Society at the Birmingham Meeting.

On behalf of the Department, I welcome Members of The Physiological Society, as well as other friends and colleagues from this country and abroad, to the Birmingham Meeting. The scientific programme is very large. Together with the contributors, we will do our best to make this stimulating and hope the social events will suitably reflect the spirit of the season.

JH Coote



## LETTER FROM THE EDITOR

Last issue there were some mistakes for which I apologise, particularly to the contributors concerned. As a consequence, we have made strides to tighten up on the process of producing, editing and proofreading the *Magazine* between two offices. This may also be helped by the fact that the *Magazine* will now be produced only four times a year and not in conjunction with every Physiological Society Meeting. In 1995 you will receive the *Magazine* in March, June, August and November.

As this is the festive season, we have included a few extras in this issue. Roy Levin has kindly sent us the alternative text on reproduction, Nick Davies a few hints on what to drink over "The" dinner, and Heather Dalitz has compiled a crossword to be completed during the long dark hours between hot roast turkey (3.00 pm) and cold turkey sandwiches (9.00 pm). There will be a small prize (to be determined) for the first correct puzzle to be opened. Answers to HD at Oxford no later than 6 January. John Widdicombe has generously agreed to award a bottle of wine (vintage withheld but I hope not *Vin de Table*) to the best entry for the caption contest (see Special Features). This may provide a little intellectual diversion from in-laws, spent wrapping paper and cold turkey (yet again) on Boxing Day. We've failed for New Year's Eve so get down to the more heady stuff of Committee News.

We are also introducing a new "Press Campaign" so that upfront science news can be released to the press coincident with presentations of abstracts at Meetings. To do this, authors submitting abstracts are invited to write a short paragraph about the significance of their work in terms of what interest it might be to the general public. Sadly, most abstracts are only written for the specialist and it is often difficult to discern the significance of contributors' work in a broader physiological perspective. Let me give you a hypothetical example of a typical abstract (no disrespect): "We have previously shown that pore A regulates pore B. We now show that this interaction occurs through the release of substance X." After a couple of paragraphs of results, the last sentence invariably contains some generalised statement such as "Results suggest that pore B is regulated by the release of substance X after closure of pore A." That's not news, as such ... but it could be.

Interpreting the results for media caption, the submitted "press" paragraph may read like this: *Hangovers are associated with dehydration and retention of tannins. What is not known is how these tannins are reabsorbed by the kidney after filtration. Our experiments have shown that the alcohol-induced closure of pore A through inappropriate release of a hormone, simultaneously stimulates the release of substance X. This, in turn, opens a mercury-activated channel for the reabsorption of tannins. Since vodka is a powerful inhibitor of mercury-activated pore opening, a large glass of this spirit could help prevent the head thumping symptoms of a hangover.* Such a summary could at least lead to a story line for the press. So if you think your latest research has any newsworthy foundation, **please** submit a short paragraph with your abstract. We can deal with the press release and obtain any further information that is required.

And after Christmas, New Year's resolutions? More ideas and fillers for the *Magazine* (I've now lost all my friends through bullying for articles and had to fill in this time) and don't forget that if the Society is going to raise its profile in the media (we have had some success to date), then we need your help. In the meantime, Season's Greetings an' all that.

Saffron Whitehead

## NOMINATIONS FOR NEW COMMITTEE MEMBERS

The Committee will soon be considering its nominations for the elections at the 1995 AGM. Any Member who would like the Committee to consider an individual for nomination should write in confidence to the Committee Secretary, The Physiological Society, PO Box 506, Oxford OX1 3XE by the end of January 1994.

Nominations for Ordinary members of the Committee can also be made, with the agreement of the nominee, by five Members of the Society. These nominations should be sent to reach the Committee Secretary by 22 May 1994. It is the Committee's policy to make fewer nominations than the number of vacancies arising and it hopes that Members will ensure that there is a reasonable field of candidates proposed.



Chris Fry, Chairman of the Education & Information Sub-Committee, has agreed to be nominated for election to the office of Meetings Secretary at next year's AGM.

## CORPORATE MEMBERSHIP

The Society has a category of Corporate Membership, but has not yet elected any Corporate Members. The Articles of Association, Domestic Rules and Standing Orders detail the qualifications for Corporate Membership, the procedure for election and the arrangements that would apply after election. The Society's Committee set up a Working Group to consider whether Corporate Members should be nominated for election and has accepted the Working Party's recommendation that this should be done.

The Society has always enjoyed a healthy and productive relationship with industry, in particular pharmacological companies. We have many Ordinary Members working in these companies. Some have served on the Society's Committee. The officers of the Society and organisers of Meetings have excellent co-operation with industrial colleagues. Pharmaceutical and other companies offer prizes to Society Members, support our Meetings by taking exhibition space and in general provide valuable collaboration with the Society and its Members.

The Committee wishes to broaden the range of industrial companies that are associated with the Society and to increase our interaction, and believes that there are particular benefits to the Society in doing this. Such collaboration would help to identify careers in industry for young physiologists. It would encourage able physiologists in industry to become Members of the Society and to attend our Meetings. Joint activities between the Society and industry could be identified: for example, the support of Special Interest Groups, workshops and symposia. There might be occasions when a combined approach by the Society and its Corporate Members would be

important: for example, in relation to Parliamentary and governmental bodies and on issues such as animal experiments.

There would also be advantages for industrial companies. They could more readily obtain advice about recruitment of physiologists. They could identify developing fields of research that are relevant to industry, and encourage work in these fields, for example, by supporting workshops and symposia.

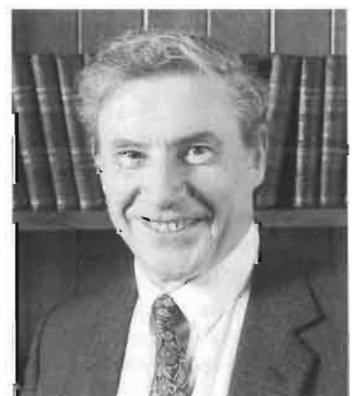
The Society's Committee considered carefully the arguments for and against implementing Corporate Membership. While supporting this move, the Committee recognised that the Society must not compromise its status as a charity by allowing industry to dictate or seem to dictate the nature of its scientific activities. For this reason the implementation of Corporate Membership would not be primarily in order to increase the Society's income and caution would be exercised in considering how Corporate Members might earmark financial contributions for specific purposes.

The rules of the Society are specific and detailed about Corporate Membership. Applications must be approved by the Committee and nominated Corporate Members must be elected by vote at an AGM or SAM. Corporate Members will receive full details of our Meetings and supplementary papers, including the *Magazine*. They can send two delegates to each Meeting, but not to the AGM or the SAM. The delegates cannot vote on publication of abstracts. Corporate Members will pay a subscription determined by the Honorary Treasurer, and in practice approved by the Committee. Corporate Membership is restricted to organisations deemed to be in sympathy with the aims of the Society and, under Standing Orders, at least one of the following criteria must apply:

- the organisation must employ persons who are Members of the Society or who by the nature of their work are potential Members of the Society
- it must fund or help to fund teaching or research in physiology or a related science
- it must have a demonstrable interest in the advancement of the physiological sciences and/or the results of physiological research.

The Committee considers that the qualifications for Corporate Membership and the rights and requirements that apply to Corporate Members are appropriate and will ensure that the election of a Corporate Member will benefit the Society. Subject to hearing the views of Members of the Society, the Committee hopes to nominate a small number of Corporate Members for election at the AGM in 1995. Members of the Society are advised to read Articles of Association 11, 7, 8, 16; Domestic Rules B1, B2, B5 and D1f, and Standing Order B1d. They are invited to send any views and comments to me before 14 January 1995.

John Widdicombe



## RECOMMENDATIONS OF THE WORKING PARTY ON FOREIGN MEMBERSHIP

At the Committee's last Special Meeting an ad hoc working party was established to examine in detail the implications for the Society of abolishing the category of Foreign Membership, whether formally or by change of practice.

The Working Party recommended that

- Ordinary Membership should in practice be open to all, regardless of their place of residence, provided that they fulfilled the requirements stipulated in Standing Order B1.
- all existing Foreign Members should be invited to transfer to Ordinary Membership
- the views of the membership be sought via an article in the *Magazine* and, if Members' responses did not raise issues which had not been considered, the Domestic Rules should be modified to reflect this change of practice

The Committee agreed that the category of Foreign Membership should not be abolished since this would entail changing the Society's Articles of Association, which would be a complicated and lengthy procedure. The implication of this is that while the Society could adopt the practice of encouraging candidates for Membership to opt for Ordinary Membership, it could not compel them to do so; those in some countries might prefer to continue as Foreign Members for tax reasons.

All candidates for Membership would continue to be subject to strict scrutiny to ensure that they fulfilled the criteria for Membership.

The Committee agreed that it would propose that the Domestic Rules be modified to reflect this recommended change of practice, subject to Members having been given this opportunity to express their views. Members wishing to do so should write to the Committee Secretary, Dr C A R Boyd, at The Physiological Society, PO Box 506, Oxford OX1 3XE by 1 January 1995.

### Membership of The Physiological Society

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

- A candidate must have given at least one Communication or Demonstration in person to the Society.
- A candidate must have published at least one full research paper on a physiological subject in a reputable journal.
- The candidate must obtain the signatures of SIX Members of the Society who will sign a statement declaring that the candidate is well known to them, is practising in physiology or a cognate subject and is likely to remain so, fulfils the criteria for Membership and is likely to benefit from Membership of the Society and take part in its activities.

Full details and forms are available from the Administrator (Membership), The Physiological Society, PO Box 506, Oxford OX1 3XE, tel (01865) 798498, fax (01865) 798092.

## CHANGES IN MEMBERSHIP NOMINATION PROCEDURES

At the Special Meeting, the Membership Sub-committee was asked to review the current proposal forms for Membership with a view to proposing amendments which would more expressly place the onus on proposers to vouch for the credentials of candidates for Membership.

The Committee has agreed to adopt the Membership Sub-Committee's recommendations as follows and the proposal forms have been amended accordingly.

- Candidates are no longer required to give an opinion on the probability that they will remain in physiological research. The onus for this judgement now falls on the Principal Proposer.
- Candidates are no longer required to submit a paper for the Committee's consideration. Instead, they are required to submit a brief CV, giving details of their scientific career together with a full list of publications, of which one must be highlighted as best demonstrating the nature of the candidate's work and its relevance to the scientific interests of the Society.
- The Principal Proposer is now required to accept responsibility for verifying the candidate's details.
- In the criteria for Group I candidates the word "normally" has been deleted from the second sentence (see Standing Order B1b, page 39 of the 1994 edition of the *Grey Book*). This means that it is now a requirement for Group I candidates to have given a Communication or Demonstration in person to the Society.

## MEMBERSHIP SUBSCRIPTIONS AND REDUCTIONS: 1995

The subscription rates (net of reductions and extra charges), which are the same for 1995 as for 1994, are set out in the Notice of Annual Subscriptions circulated with this issue of the *Magazine*. The Notice also gives details of acceptable methods of payment. Members are reminded that their subscriptions are due on 1 January and that they are not invoiced individually.

Any Member who wishes to stop or resume receiving *The Journal of Physiology* and/or precirculated Abstracts and any Member who has retired during 1994 should inform the Administration Office **immediately**, so that mailing lists and subscription records can be amended in time.

There is no need for cancellation of your direct debiting instruction if your subscription rate is about to change: the amount collected from your bank account will be amended automatically.

If you wish to check the amount to be collected or to check that your direct debiting instruction is still in place, please contact Jane Ault at the Administration Office, tel (01865) 798498, fax (01865) 798092, international dialling code +44 865, Email [hkdalitz@vax.ox.ac.uk](mailto:hkdalitz@vax.ox.ac.uk).

## ANIMAL ETHICS COMMITTEES

The question of whether animal ethics committees should be set up within universities and research institutes in the UK is being discussed widely by these institutions and by the various research funding bodies.

The debate is rather confused because such terms as "animal ethics", "animal care and use", "animal procedures" and "animal care" committees are being used both to describe committees that deal with the general administration of the animal house and those that deal with the ethical issues of whether particular experiments should take place. Indeed, a recent booklet produced by the RSPCA makes no attempt to separate these two very different remits and argues in favour of animal ethics committees that would deal with "all aspects of animal care and use". Most of the arguments presented in the document relate to the way in which institutions run the animal house, *ie* to animal care rather than to ethics *per se* and yet these arguments are used to justify committees that would consider all animal experiments for which authority is sought under the 1986 Act, before application is made to the Home Office.

The Animal Welfare Sub-Committee and the main Committee have recently discussed the issues and present their views below. We would now like to gather the views of the membership of the Society.

We are in no doubt that a committee or some formal administrative structure that deals with the running of the animal house and the general issues of animal care is essential within every institution that has an animal house and is licensed under the 1986 Act. We have also agreed that a structure that deals with the ethics of the new "technologies" such as transgenic animals may be useful. It would be important that such a body provides a **national** view, not a local one, since the issues have wide implications.

However, we have severe reservations about the necessity for and wisdom of setting up committees that deal with the ethics of all animal experiments for which permission is sought under the 1986 Act. Importantly, we see no reason to believe that the animals would be better served if such ethics committees were in place. Our main arguments are outlined below:

### Existing ethical consideration via the licensing system

The 1986 Act is specifically intended to safeguard animals used in research, to prevent cruelty and to ensure that the experiments performed are designed such that they will yield results of scientific value with the minimum of suffering to the animals used. The Home Office Inspectorate, the answerability of scientists to the Home Office Inspectorate, the training courses for Personal and Project Licensees have all been put in place to ensure that scientists do operate within the Act.

Specifically, every scientist has to hold a Personal Licence and has to work within a Project Licence. A Project Licence is not granted unless the Home Office Inspectorate is convinced that the programme of

proposed work is well designed from a scientific point of view, likely to yield results that are of scientific value and/or benefit man or animals and that the end justifies the means.

Since April 1994, any new potential holder of a Personal Licence has had to undertake an Accredited Training Course and formally satisfy the Home Office that s/he has the knowledge and understanding required to hold such a Licence. From 1995, similar requirements will be made of any new potential holder of a Project Licence.

### Existing ethical consideration by the Animal Procedures Committee

Under the 1986 Act there already exists the Animal Procedures Committee (APC). This is a statutory body which has the duty to advise the Home Secretary on policy and practical matters over a wide area. The APC reflects a wide range of expertise and presently consists of 21 individuals who have a range of legal, ethical, animal welfare and research experience. The Home Secretary may refer matters to the APC, but it is free to select its own areas for consideration.

This is a very active committee that meets on average once a month. Since its inception in 1986, the APC has considered many areas of public concern, including the use of animals in behavioural and psychological studies and infringements of the Act. Its recent considerations on toxicity testing will affect practice. It also advises the Home Secretary and thereby the Home Office Inspectorate on all applications concerning cosmetics, tobacco, alcohol, the acquisition of microsurgical skills and work involving primates.

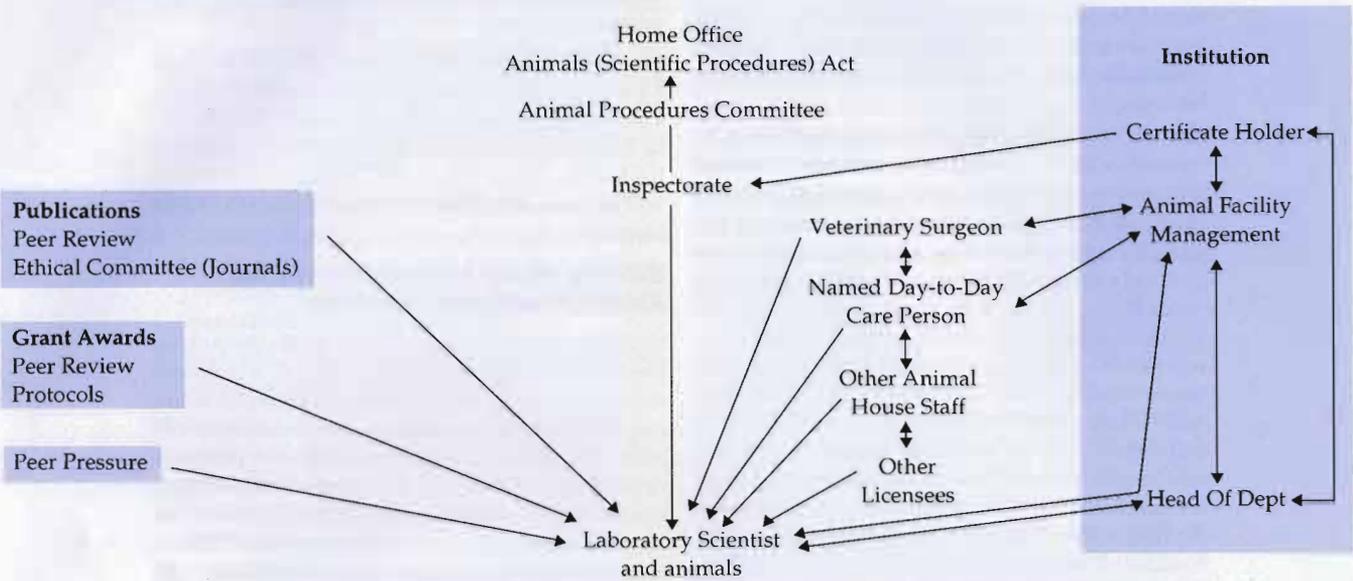
Thus, we already have a national committee for animal experimentation which continuously revises the framework within which experiments on animals can be performed in the UK and which therefore sets a national standard. This committee, like all Licence Holders, has continually to assess the balance between cost to the animals and the benefits which derive from their use, *ie* the ethical basis.

### Existing ethical consideration by research funding bodies, societies and journals

Virtually all biomedical research performed in universities and research institutes in the UK is financially supported by one of the Research Councils or charities, which have put their own safeguards in place. For most grant applications, the applicant has first to provide evidence that permission to perform the proposed plan of work has been granted under the 1986 Act by the award of the appropriate Project and Personal Licences. Further, many require that the applicant gives good reasons why animals must be used for the work and which alternatives have been considered. If animals are the sole choice, then the applicant must justify the species and numbers.

These formal requirements are superimposed upon a critical peer review process which is concerned with evaluation of the likely scientific value of the proposed project and the appropriateness of the experimental design. The latter either explicitly or implicitly requires consideration of the proposed use of animals.

## A TYPICAL STRUCTURE OF ACCOUNTABILITY FOR SCIENTIFIC WORK ON ANIMALS



Most scientific journals and many scientific societies, such as our own, have an ethical editor and ethical committees respectively, who assess whether work, usually from abroad, meets the strict standards that operate within the UK.

#### Problems with local ethics committees

In other countries, where there is no equivalent of the 1986 Act and animal ethics committees are required by law as an alternative, there is considerable variation both regionally and over time in the type of experimental work on animals for which permission is granted. The Swedish experience provides a good example: in some institutes the type of research performed on animals has been largely unchanged since the instigation of ethics committees; in others it has been virtually halted.

In the UK, before the introduction of the 1986 Act, there was extensive discussion on whether an appropriate form of control could be exerted through ethics committees. It was decided that the inspectorate and licensing system defined by the 1986 Act offered a much more effective control that could be applied uniformly across the country. It was also decided that it would be inappropriate to mix the two systems because the intended direct and independent assessment of individual researchers by an experienced and knowledgeable inspectorate was likely to be compromised by a formal system of ethics committees.

#### Potential confusion between local ethics committees and the Home Office

If a system of ethics committees were to be introduced in the UK, the relationship between the local animal ethics committee and the 1986 Act would be confused. In the end, the Inspectorate must have the final legal authority to sanction or not sanction the work. If a local ethics committee were to wish to block a particular project that would be allowed under the

1986 Act, then what would happen? An appeal system could be set up to deal with such cases, but what would be the point if the Home Office has the legal authority?

At the very best, it may be that an ethics committee would identify an area of research that should receive special consideration by the APC. Given the safeguards that are already in place as indicated above, such areas will almost inevitably be identified by one of these mechanisms. The unlikely possibility that a problem might be missed by all of these bodies does not seem a convincing argument for introducing another layer of bureaucracy into a system that is already very tightly controlled.

#### Composition of ethics committees

The question of who should sit on a local animal ethics committee serves to emphasise the problems associated with introducing such a system. What qualifications should any lay members have? Would their view point on the general issue of experimentation on animals need to be known? If the make-up of a committee were such that the lay non-scientific members and members of the general public were in the minority, then it could be argued by those members and, indeed, by those against animal experimentation, that they could never influence the decisions made by the committee.

At best, it could be argued that their only purpose would be to promote open discussion of the issues. At worst, they could be seen as tokens, placed on the committee to make it seem as if justice were being done, but not to influence policy.

If, on the other hand, the lay members were in the majority, then the decisions taken by the committee could reflect the spread of views of those lay members. This may vary from time to time when there is turnover of the committee members and would not necessarily

reflect the purpose of the 1986 Act. Indeed, the decisions taken by the committee might depend primarily on the ability of the scientific members of the committee or of the applicant to explain the project in lay language. This would not be a sensible or desirable outcome.

The 1986 Act was drawn up to avoid such potentially fickle decision-making bodies being involved in animal experimentation. Indeed, it can be argued that ethics committees are necessary for human experimentation in the UK solely because there is no equivalent of the 1986 Act to deal with experimentation on people.

In summary, there is no reason to suppose that the purposes of the 1986 Act would be better served if a mandatory system of animal ethics committees were in place. There is every reason to suppose that such a system would prejudice science and be of no benefit to the animals.

The desire of some to introduce animal ethics committees does not seem to be driven by a perception that the 1986 Act is failing to work as it should. Rather, the problem, if there is one, may be that we, the scientists, have failed to convey to our academic colleagues who have no involvement in animal experimentation and to the lay public, the network of existing controls that are provided by the 1986 Act.

### **I'm Alive! Thanks to Animal Research**

Reflecting on the importance of animal research to the health and well being of all citizens, the American Physiological Society has produced a T-shirt that states "I'm Alive! Thanks to Animal Research". The T-shirt incorporates the logo from the Saving Lives Coalition in its design. T-shirts can be ordered from The American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991, USA, tel (00 1) 301 530 7118, fax (00 1) 301 571 8305. Each T-shirt costs \$10 (US residents) or \$13 (overseas). Please state required colour (red or turquoise) and size (medium, large or extra large) when ordering.



What do you think? If you have strong views, please write to Richard Boyd, Committee Secretary, The Physiological Society, PO Box 506, Oxford OX1 3XE.

*Animal Welfare Sub-Committee*

#### **Reference**

Ethics Committees for Laboratory Animals: a basis for their composition and function. May 1994. Maggie Jennings, Research Animals Dept, RSPCA Headquarters.

### **Animal Procedures Committee**

#### **Animals (Scientific Procedures) Act 1986**

### **RESEARCH TO REDUCE THE SEVERITY AND NUMBER OF EXPERIMENTS ON LIVING ANIMALS**

Suitably qualified groups or persons working in the United Kingdom are invited to apply for Home Office grants to support research which could lead to the reduction, refinement or replacement of the use of living animals for experimental or other scientific purposes.

Grants, which will be available from April 1995, may be awarded for periods of up to three years.

The research scheme is administered by the Animal Procedures Committee, which advises the Home Secretary on the priorities for research and assists in the selection and evaluation of proposals.

Proposals may also be evaluated by independent assessors.

Preference will be given to projects most likely to result in a reduction in the severity of procedures or early and substantial reduction in animal usage rather than supporting fundamental investigative work. Research concerned with the welfare and husbandry of experimental animals will also be considered.

Successful applicants will be required to give undertakings that the results of their research will be published or will otherwise be made generally available, and to provide periodic progress reports to the Committee.

Further details may be obtained from:

Animal Procedures Committee  
c/o E Division  
Home Office  
Room 978  
50 Queen Anne's Gate  
London SW1H 9AT  
tel (071) 273 2770.

Completed applications must be received by the Animal Procedures Committee by 16 December 1994.

### GUIDELINES FOR WORKSHOP ORGANISERS

- 1 Workshops are intended to provide a forum for the exchange of information about techniques relevant to Physiology. This exchange may either be: (i) between those experienced in the use of a particular technique and relative newcomers to the area, or (ii) between experienced researchers in an area who wish to exchange information or to discuss areas of common concern or difficulty.
- 2 The format of a workshop is not fixed but is left to the organiser(s). It is expected, however, that workshops will be practically-based with the ability for "hands-on" experience of the technique under discussion, particularly for workshops which fall into category (i) in paragraph 1 above.
- 3 In order to maximise discussion and the ability to obtain "hands-on" experience, it is expected that a workshop would have no more than 20-25 participants.
- 4 The workshop should last no longer than two days and may be held either independently of or in conjunction with a Scientific Meeting of The Physiological Society.
- 5 Workshops can be organised by or through any Member of The Physiological Society.
- 6 Anybody who would like to organise such a workshop should submit a written proposal, not exceeding one side of A4, to the Chairman of the Education & Information Sub-Committee. This proposal should outline the subject of the proposed meeting, its purpose, the main contributors, an estimate of costs, the venue and date(s).
- 7 The workshop must be open to all interested Members and Affiliates of the Society. Non-Members may also attend if their attendance is formally recommended by a Member of the Society. Applicants not falling within these categories may not attend. Preference is to be given to (i) Affiliates and (ii) Members, if demand exceeds the places available. No charge can be made to those attending the workshop, except for domestic arrangements (meals and accommodation). Individuals from Third World and Eastern European countries wishing to attend a workshop may apply to the Foreign Secretary for financial assistance.
- 8 Organisers are responsible for ensuring that all Members of the Society receive notice of the Workshop. This can be done by placing a notice in the programme of a Scientific Meeting and/or in the Society *Magazine* and should be in time for Members to be able to respond to the notice.
- 9 The amount allocated to each workshop or symposium will depend on need and on demand but would not normally be expected to exceed £2,000 per workshop. This money can be used to cover administrative costs and to contribute to reasonable travelling expenses for key contributors to the workshop; honoraria may not be paid to such contributors. All financial commitments and arrangements by the organisers must be agreed with the Chairman of the Education & Information Sub-Committee in advance and the Treasurer must be notified of the financial details before the workshop. If other funding is obtained for a workshop, which then makes a profit, the Physiological Society will expect as much as possible of its contribution to the Workshop to be repaid. Workshop funding is not available for "internal" meetings between members of a single institution.
- 10 A short report (not more than two sides of A4) on the workshop must be sent to the Chairman of the Education & Information Sub-Committee within the two months following the workshop.

### WORKSHOPS

The Committee has now agreed a set of Guidelines for Workshop organisers (see box).

The Education & Information Sub-Committee is keen for further Workshops to be held and Clive Orchard in Leeds is acting as the member of the Sub-Committee responsible for stimulating the organisation of Workshops. He would be very glad to hear from any Member of the Society who would like to organise a Workshop or who can identify a suitable topic for a Workshop.

Anyone interested should contact either Clive Orchard, Dept of Physiology, University of Leeds, Worsley Medical & Dental Building, Leeds LS2 9NQ, tel (0113) 233 4244, fax (0113) 233 4248, or Chris Fry, Chairman of the Sub-Committee.

### SET<sup>7</sup>

The Office of Science & Technology last year introduced a national week of Science and Technology -SET<sup>7</sup> - with a view to introducing science and technology



to the public through a variety of events. Any sector of the population could be targeted but particularly successful events included presentations in public places, where demonstrations of scientific and technological interest were made directly accessible. Some physiological demonstrations were put on last year but the biggest problem encountered was one of local publicity for such events.

A similar event is planned for 1995 in the week commencing Friday 17 March. If any departments or individuals wish to participate in any way, The Physiological Society can assist in publicising your event. The *Magazine* office can ensure publicity in the local press and if you wish to take advantage of this facility please contact Saffron Whitehead or Deborah Paul at the *Magazine* office, Dept of Physiology, St George's Hospital Medical School. Please also check with the local authorities before planning any public demonstration and note that The Physiological Society cannot accept responsibility for any events.

A public launch of the Preliminary Programme of events took place in October and the final programme is due to be released in January. Limited funding is available from the Office of Science and Technology to help small organisations and individuals. Details can be obtained from Cheryl Davies, c/o the Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, tel (0171) 839 5561 ext 247.

Please contact me if you need any further help.

*Chris Fry*  
Chairman, Education &  
Information SubCommittee

## WHY DOES THE SOCIETY SUPPORT A CENTRE OF EXCELLENCE IN UKRAINE?

*Nina Burdakova interviews Alexei Verkhratsky*

The first of several Physiological Society support schemes for centres of excellence in Eastern Europe and the Third World was established towards the end of 1993. The Bogomoletz Institute of Physiology of the Ukrainian Academy of Sciences was the first choice because of (a) its recognised scientific excellence, (b) the very serious economic problems in Ukraine and (c) the very favourable exchange rate between UK and Ukrainian currencies, allowing a relatively high impact of a small grant.



*The Bogomoletz Institute of Physiology*

A major part of the award (£9,000 for the first year) has been used to give personal support grants (£350 each) to 13 young physiologists working at the Bogomoletz Institute in Kiev. The support grants will allow these colleagues to concentrate their activities on research work in the laboratory rather than on simply surviving. The Ukrainian economy recently became so weak that it was unable to give the essential minimal support to keep its elite institutes open and a £2,000 core support grant (part of the £9,000 package for Kiev) was therefore also awarded to the Bogomoletz Institute. It is part of the scheme that some of the 13 colleagues in receipt of the personal grants may come to the UK to participate in a Physiological Society Meeting and present results obtained with the help of our financial support. The first of these visits will occur at the Birmingham Meeting this year.

This summer, Alexei Verkhratsky, Secretary of the Bogomoletz Institute of Physiology's International Centre of Molecular Physiology in Kiev worked at the Physiological Laboratory in Liverpool supported by a grant from The Wellcome Trust. Nina Burdakova from the Foreign Secretary's office took the opportunity to interview him about the Ukrainian Support Scheme.

*What is the current situation of science in Ukraine?*

"After the disintegration of the USSR, the newly established countries faced increasing pressures due to the poorly organised economy and the transition to the free market. Certainly, the situation in science reflects the economic troubles and in general we have

experienced a marked reduction of funding for basic scientific research. The current financial support is only just sufficient for very small salaries (£10-20 per month) and maintenance of some of the most basic facilities in our research institutions. We have no government funds for equipment and chemicals, and research activity has ceased in most institutions. It is now necessary to compete for foreign grants."

*What is special about the Bogomoletz Institute of Physiology?*

"Fortunately, the Bogomoletz Institute of Physiology has a strong international reputation. The Institute was the leading organisation in neuroscience research in the whole of the USSR and therefore the majority of the international meetings in the USSR in the field of neuroscience or membrane physiology were held in our Institute. The scientists working in the Institute (Kostyuk, Krishtal, Shuba, Skok and many others) have the best international citation record among former Soviet physiologists."



*The Director of the Bogomoletz Institute Prof Platon Kostyuk and Prof Oleg Krishtal with some of the recipients of Physiological Society grants. From left to right: V Panchenko, A Shmigol, Prof P Kostyuk, S Kirischuk, Prof O Krishtal.*

*You mentioned other foreign grants. Do you think that the relatively small Physiological Society grant can be of real significance compared to the more substantial grants from, for example, organisations like Soros?*

"Unfortunately, quite a number of international foundations which offer grants for Former Soviet Union (FSU) scientists are very bureaucratic. Although we won several grants from the ISF (Soros Foundation), we have not yet received any real support. But I hope that at least some of the promised funds will be made available soon. In contrast, the help offered by The Physiological Society was effective and it came at the right moment. Last winter, when the whole scheme started, our Institute was just about to be closed due to lack of funding for electricity and heating. The financial support from The Physiological Society helped us very much to overcome these difficulties. I would like to stress that the salary our scientists receive cannot cover even basic necessities. To survive, people start looking for any additional jobs. Under these circumstances the support of The Physiological Society was really vital. It enabled our

young scientists to concentrate on science rather than on mere survival. The amount of support they got was quite substantial (£350 is more than their annual salary). In addition, our young scientists received not only financial support, but also strong encouragement and the feeling of belonging to the international physiological community. So, The Physiological Society's Support Scheme has had a strong impact on our Institute."

*How do your colleagues manage their research without government funds for chemicals and equipment?*

"Due to the high international standing of the Bogomoletz Institute, we have close connections with scientists all over the world and our colleagues abroad help us a lot with chemicals and even with some pieces of equipment. We highly appreciate the help which is continuously coming from the UK and Germany; without this supply of chemicals, science would simply be impossible in our Institute. Using this help we are able to produce decent scientific results that can be published in, for example, *J Physiol* and *Eur J Physiol*. Nevertheless, it is now more and more difficult to operate in this way and we would certainly appreciate specific support for chemicals."

*Do you think the choice of candidates selected for personal grants was fair?*

"We worked closely with the Foreign Secretary's Office in Liverpool in order to choose the best young scientists who are carrying out research of international standard. I understand that the individual applications from our young scientists were subsequently scored by members of the Foreign Secretary's and Grants Sub-Committees. The whole scheme worked very effectively and fast. The selected candidates got their money within several weeks after The Physiological Society's decision. I believe that the main criteria for selection were (1) publication activity and (2) expected progress. It seems to me that the final choices were right. During this last year (*ie* after receipt of the grants) the grant recipients already submitted seven papers (to *J Physiol*, *Cell Calcium*, etc) which reflects their progress."



Sergei Kirischuk at work in his lab. Sergei is one of the first to present his work here supported by The Physiological Society (Birmingham Meeting).

*We have heard that the Institute was officially closed for July and August, due to lack of funds for salary payments. What about the recipients? Was their work also paralysed?*

"Well, the Institute was indeed officially closed due to shortage of money. However, it was not forbidden to continue experiments but one disadvantage was the lack of salary from the Institute. Most of the grant recipients, nevertheless, just continued their research. Without the personal support grants from The Physiological Society this would, of course, have been impossible."

*Is there a need for the Scheme to continue?*

"Certainly. I believe that if the Scheme continues it will contribute a lot to our desperate efforts to preserve the Bogomoletz Institute as a real centre of excellence in the field of Physiology in the FSU and as one of the best educational centres which has always attracted the brightest students. Even under the most difficult circumstances, our scientists have managed to obtain sound scientific results. I am absolutely convinced that if the Bogomoletz Institute survives it will remain a first rate research centre working for the benefit of world science. If we lose the battle, the scientific world will lose one of the few centres of excellence which still exist in the FSU. I would like to stress once more that the Bogomoletz Institute has made a tangible contribution to the development of cellular physiology; more than 50 scientists from our Institute are currently working in laboratories abroad. I guess at least 15 of them are working in UK laboratories. I believe they make substantial contributions to physiological research."

*A slightly provocative question: What happens in a few years' time, when The Physiological Society's support must stop?*

"Hard to say, I don't know what will happen in Ukraine. Naturally, we have to reorganise: there are too many people involved in science in our country. I think the number of positions should be reduced by a factor of 10-50. If this happens, we would have enough facilities to support those who make really valuable contributions. Although, if the current bureaucratic system persists, I am personally very pessimistic."



Nina Burdakova

## ELECTRONIC COMMUNICATIONS: EMAIL (AND OTHER MYSTERIES)

In the last issue of the *Magazine*, some confusion was caused by (my) abbreviation of a paragraph explaining how readers could access the Iconographic Collections Videodisc catalogue. The text originally read:

*The catalogue, which contains at present records for about 17,000 pictures and some 220,000 publications by 160,000 authors, may be consulted through the [UK's] Joint Academic Network (JANET): the JANET address is UK.AC.UCL.WIHM. Internet users can consult it by keying in WIHM.UCL.AC.UK.*

This was edited for space reasons and the printed text read:

*The catalogue, which contains at present records for about 17,000 pictures and some 220,000 publications by 160,000 authors, may be consulted through the Joint Academic Network (JANET) or Internet. The Email address is uk.ac.ucl.wihm.*

We apologise to William Schupbach, author of the article, and to anyone who was confused by this. It did, however, bring to light the need to clarify the distinction between JANET and Internet addresses for both overseas readers and those who, like the Administration Office, are newcomers to the wonders of electronic communications. For all the following information, I am indebted to Andy Mell, DTP Assistant at the Society's Publications Office in Cambridge, who answered my naive questions as follows:

*Q In an article in the last Magazine, there were details of a catalogue which could be inspected by JANET and Internet users by keying in either wihm.ucl.ac.uk or uk.ac.ucl.wihm.*

*I haven't been able to get to the catalogue by this means.*

**A** What you do at the vax or unix prompt is:

type: telnet wihm.ucl.ac.uk then type w (uppercase) and press return - and you're there!

*Q Many thanks - I have managed to see the catalogue using the TELNET command with the address wihm.ucl.ac.uk. But why can't I see it using the address uk.ac.ucl.wihm?*

**A** The wihm.ucl.ac.uk address is in Internet order (notice the "uk" bit comes last) and the uk.ac.ucl.wihm address is in JANET order ("uk" comes first).

The two are interchangeable in that if you have a JANET address you can simply reverse the components so that it becomes an Internet address. This is generally true. JANET addresses (where the "uk" comes first) only work in the UK and Telnet will only understand Internet addresses.

*Q I don't know what TELNET actually means/does but it does seem that when trying to access the videodisc catalogue the JANET and Internet addresses are not interchangeable as they are with Email. Why?*

**A** The only reason the JANET and Internet addresses are interchangeable for Email is because the JANET addresses are being converted to Internet address ordering by your local mail system (and this is only true from inside the UK). All those people abroad cannot use Janet addresses but they can work out an equivalent Internet address by reversing the address.

## Email addresses in the *Grey Book*

The most recent edition of the *Grey Book* contains a mixture of JANET and Internet addresses. The Email addresses that have "uk" first are JANET addresses and will not work outside the UK. However, readers can easily translate them into Internet addresses simply by reversing the order of the items following the @ sign. For instance, my Email address is either:

JANET hkdalitz@uk.ac.ox.vax

Internet hkdalitz@vax.ox.ac.uk

In future editions of the *Grey Book*, all Email addresses will appear in Internet format.

*Heather Dalitz with the help of Andy Mell*

## MORE MONEY FROM THE DALE FUND

The Grants Sub-Committee has reviewed the maximum amount available from the Dale Fund for its primary purposes (eg travel to other laboratories for collaborative work, attendance at practical workshops and courses to learn new techniques, etc). It has agreed that the maximum award be increased from £500 to £800. The amount available for attendance at conferences, which is viewed as "seed-corn" funding, has been held at £300.

## PATON PRIZE BURSARIES IN HISTORY OF PHYSIOLOGY

The Historical Studies Sub-Committee of The Physiological Society invites applications for the **Paton Prize Bursaries** (value £1,000) which will support specific projects in the history of Physiology. The bursaries, which will be offered on a competitive basis, will be awarded to individuals who produce an account which explores, in depth, the historical development of one of the major ideas and concepts which have shaped modern physiology, ie over the late 19th and 20th centuries.

Applications are invited from individuals in any discipline and the Sub-Committee is particularly keen to receive entries from young scientists at postdoctoral and post-graduate levels.

Further details are available from Professor C Kidd, Physiological Society Historical Sub-Committee, Dept of Biomedical Sciences, Marischal College, University of Aberdeen, Aberdeen AB9 1AS, tel (01224) 273006, fax (01224) 273019.

**Closing Date for entries: 31 January 1995**

*See page 42 for details*

## NEUROENDOCRINOLOGY

### Future Meetings: Birmingham & Beyond

The Birmingham Meeting of the Society promises to be a valuable one for those interested in neuroendocrinology. In addition to the symposium on *Amino acid neurotransmitter regulation of the neuroendocrine hypothalamus*, there will be a full Session of 12 Communications, a number of which are related to the symposium topics, and a small poster session.

Events planned for next year include, as previously announced, a symposium entitled the *Neuroendocrine Hypothalamus* at the joint meeting with the Japanese Physiological Society in Okazaki on 27-28 March. Details have been circulated and I hope a number of neuroendocrinologists have applied for grants to attend.

Later in the year a one day meeting in Cardiff is planned, which will be run in conjunction with a one and a half day meeting of the British Neuroendocrine Group. The full list of speakers is not yet available but over 10-12 September there will be two symposia, one on growth and apoptosis and the other on the hypothalamus and signal transduction. There will also be a workshop on MAP kinases. We are making a particular effort to involve French neuroendocrinologists in this meeting.

Mary Forsling

## PLACENTAL & PERINATAL PHYSIOLOGY AND CARDIOVASCULAR/RESPIRATORY CONTROL

### Workshop at the Birmingham Meeting, 19 December 1994

We will hold a Workshop at the Birmingham Meeting of the Physiological Society, as a collaboration between the Placental & Perinatal and the Cardiovascular & Respiratory Control Special Interest Groups.

The theme of the Workshop will be the development of cardiorespiratory control - new techniques, new methods. The plan is to focus attention on novel ways of investigating cardiorespiratory development, as a means of providing answers to some old questions, and to look at the new questions which the methods raise. The idea is to have informal poster discussions

and demonstrations of some methods in the morning and over lunch, followed by oral presentations and moderated discussions in the afternoon.

For convenience, the afternoon session is divided into three:

- Fetal cardiovascular development
- Thermoregulation and cardiorespiratory control
- The developing brainstem

Each of these sessions will last about an hour and we will have **short** presentations from a couple of speakers followed by discussions/presentations from other participants. Professor Hugo Lagercrantz has agreed to give a short plenary lecture "Stress, arousal and perinatal cardiorespiratory function" to conclude the Workshop and to draw strands together.

All are welcome to attend this Workshop and to bring data/ideas/equipment to discuss.

If you would like to make an **oral** presentation during the afternoon of 19 December, I would very much like to hear from you so that the Chairperson of the session can structure the discussion to make sure that you are included.

We will hold an informal (and inexpensive) dinner in Birmingham on the night of 19 December. It won't be too early to get into the Christmas spirit. Please complete the special booking form in the Birmingham Meeting Programme if you would like to attend this dinner.

Mark A Hanson

### Dept of Physiology, University of Bristol

#### BRITISH HEART FOUNDATION PhD STUDENTSHIP

A Research Studentship funded by the British Heart Foundation is available for three years to work on central control of circulation and respiration. The project will look at the importance of cellular properties within neurones controlling cardiovascular reflex function. Those interested who have or expect to obtain a First or Upper Second Class degree in Biology or other relevant subjects should apply to Dr Julian F R Paton, Dept of Physiology, School of Medical Sciences, University of Bristol, Bristol BS8 1TD with a curriculum vitae and the names and addresses of two referees as soon as possible. Further details may be obtained by writing or by telephoning (0272) 287818.

## RESPIRATORY PHYSIOLOGY

### Future Meetings: Nagoya, March 1995 and Oxford, July 1995

We were represented by one Abstract at the Aberdeen Meeting and were therefore absorbed into the well subscribed Cardiovascular/Respiratory Control Session. This does not, I think, reflect a lack of vigour from those supporting Respiration-uncontaminated-by-the-cardiovascular system. It was almost certainly because the London Conference on Modelling and Control of Ventilation was held immediately afterwards.

I will remember Aberdeen primarily for two things. First is the inaugural Paton Memorial Lecture in which John Severinghaus achieved what many of us

### SPECIAL INTEREST GROUPS

Are you making the most of your Membership or Affiliation by associating yourself with one or more Special Interest Groups? If you wish to receive special communications from Special Interest Group organisers regarding events of interest in your field of research, in addition to the news published in this *Magazine*, please ensure that you are on the appropriate mailing list. You can ring, fax, write to or Email the Society's Administration Office at any time to check which Special Interest Groups you are registered with and to add yourself to their mailing lists. Both the *Grey Book* and the *Affiliate Handbook* contain re-registration forms listing the full set of Special Interest Groups and IUPS interest classifications. The IUPS has recently added a new special interest to its codings for physiologists worldwide: Molecular Physiology (IUPS coding: 33).

would have thought impossible. He presented a masterly, enlightening and yes entertaining, talk on the "History of Blood-gas and Acid-base Measurements". The audience may have included only three or four uncontaminated respiratory physiologists but it responded with a warm and appreciative, even loud, round of applause. A true connoisseur of plasma bicarbonate can transfix an audience just as effectively as one of Rafael.

The next memory that stays with me is the cost of the trip. With a little shopping around I could, give or take a few pounds, have flown to Seoul or Los Angeles for the price of my return ticket from Heathrow to Aberdeen. The answer, I now know, is to halve the price either by flying to Edinburgh and hiring a car for the final 150 miles or by spending a weekend in the highlands.

Abstracts for the Designated Respiratory Session in Nagoya (Japan) must be with the Meetings Secretary between 19 and 29 December. Do please apply to the Society for a travel grant (final date for applications is 14 November). The funds are said to be there to assist "younger Members and Affiliates"; but younger than who? Youth exists in the vitality of an Abstract, in the scramble for attention and in the lust for truth. Define yourself as younger and see what happens. I am assured that no wrists will be slapped for trying to pull a fast one. Note also that Abstract titles are *not* required for the travel grant application. The Society realises that many will be incapable of writing an Abstract until they are reassured by the promise of funding.

Abstracts for the Oxford Meeting must be received between 3 and 13 April 1995.

*Piers Nye*

## SENSORIMOTOR CONTROL

After our last bumper Session at Bristol last February, there will be another good Designated Session for our Group at the Birmingham Meeting (19-21 December), with around 25 papers in all. There will be a short AGM at the end of the Session to elect an organiser and plan future sessions.

Members are reminded that there will be at least two symposia of interest at the Joint Meeting with the Japanese Physiological Society next spring. At Okazaki (27/28 March) there is to be a symposium on Sensorimotor Processing and at Nagoya (1/2 April) there will be symposia on Vestibular Function and on Premotor-Motor Control of Voluntary Movement. It is hoped that as many members as possible will be at the Joint Meeting and able to submit work for presentation in association with one of these symposia.

Last July came the tragic news of Professor Peter Rack's death as a result of an accident whilst walking in the Lake District. Peter had only recently retired from his Chair at Birmingham. He was the founding organiser of this Group and built it up very successfully, and we all owe him a debt of gratitude for getting us started.

*Roger Lemon*

## SENSORY FUNCTIONS

The Physiological Society Meeting at Keele, on Wednesday 19 - Friday 21 April 1995, will be hosted by the University's Department of Communication & Neuroscience. This Meeting will include a one-day Research Symposium, on the theme: "Receptors and Central Processing in Vision and Hearing," on Wednesday 19 April 1995, with the emphasis on accounting for psychophysical observations in physiological terms. The programme will comprise the following eight key speakers, four international and four national: Jim Hudspeth and Ian Russell (Receptors: Hearing), King-Wai Yau and Trevor Lamb (Receptors: Vision), Mark Konishi and Andrew King (Central Processing: Hearing), Charles Gilbert and Andrew Parker (Central Processing: Vision).

Associated with the Symposium, Designated Sessions on Sensory Functions will be held, with the emphasis on receptors and higher sensory processing in vision and hearing. Additionally, the Annual Prize Review Lecture, "The Making of the Cerebral Cortex," will be given by Colin Blakemore at this Meeting.

In order to ensure a lively and stimulating Meeting, and to encourage a high level of attendance at the Symposium, supported by a good spread of Designated Communications, Demonstrations and Posters on vision and hearing, no registration fee will be levied for the Symposium.

*Andy King*

## SOMATOSENSORY PHYSIOLOGY

### Special Interest Group Social at the Birmingham Meeting

As well as partaking of the most exciting new findings in Somatosensory Physiology at our special Session, you can experience one of the great traditions of West Midlands social life by coming with us to a **real** Birmingham Balti house on the night of Monday 19 December. For the ridiculously **low price** of just £12 per head (including wine), you will be whisked by luxury coach to a noted oriental night spot offering staggeringly good food (we've tested it) in sumptuous surroundings(!). Places are limited to 53, and priority will be given to Members of the Somatosensory SIG (NB Members who have already responded to my letter of intent **must still book through the registration form**). Please indicate on the form the number of places you would like to reserve. The meal is being organised apart from the main Meeting, so please make your cheque payable to "Dr T A Lovick". Can you afford to miss such an opportunity? Hope to see you there!

*PS* The telephone number which is given by my name in the list of Special Interest Group convenors on page 17 of the new *Grey Book* is **incorrect**. My real telephone number (which you will find under my entry), is now (0115) 951 6307, and the fax is (0115) 951 6302.

*R W Clarke*

## THE HRT DEBATE

Dear Editor

The accidental inclusion in my article in the last issue of a figure belonging to Phillips *et al* has finally provoked me to commit to print some long held concerns about their claim that HRT is a "Strengthening Hormone". Firstly, the use of the word "strength" for the ratio of strength to cross-sectional area is misleading. In addition, I believe, for the following reasons, that their published evidence warrants more cautious assertions.

- Administration of HRT (Prempak C or Premarin 0.625mg), in a prospective randomised controlled trial in 116 postmenopausal women produced no change in voluntary handgrip strength over 12 months (or leg extensor power by six months), despite significant increases in bone mineral density (Armstrong *et al*, *Int Symp Ost Hong Kong*, 1993).
- Endurance exercise is associated with a fall in oestrogen levels without loss of strength; amenorrhic athletes who have the highest performance records have very low oestrogen levels.
- Variations in force per cross section with and without HRT (figure in last issue) could be explained more simply by variations in the proportion of the cell volume which is occupied by contractile protein. No significant differences in absolute strength were reported; women accumulate fat after the menopause and muscle biopsies from healthy humans show that with increasing age, and in women compared to men, there is more fat and less protein in proportion to DNA in the muscle cells (*Clin Sci* 81: 249, 1991).
- Deductions from simple ratios between variables are insecure unless the relation between the numerator and denominator passes through zero. This is not usually the case for strength and cross-sectional area.
- The variations in muscle strength found through the menstrual cycle differ from others who find a peak in voluntary strength around day 1 (*J Sp Med & Phys Fit* 31: 532, 1991). This data is vulnerable in any case to the effects of rapid hormonal change on the central nervous system which could affect maximal voluntary muscular performance.
- Representative studies of large randomised samples do not show an increase in the rate of loss of strength in women (a kink in the curve) around the menopausal years when oestrogen levels fall (see my figure in this issue), although this is apparent in such studies of bone mineral density.

The proposition that HRT might increase muscle strength is interesting but the evidence is not convincing.

Joan Bassey

## ROGER WOLEDGE REPLIES

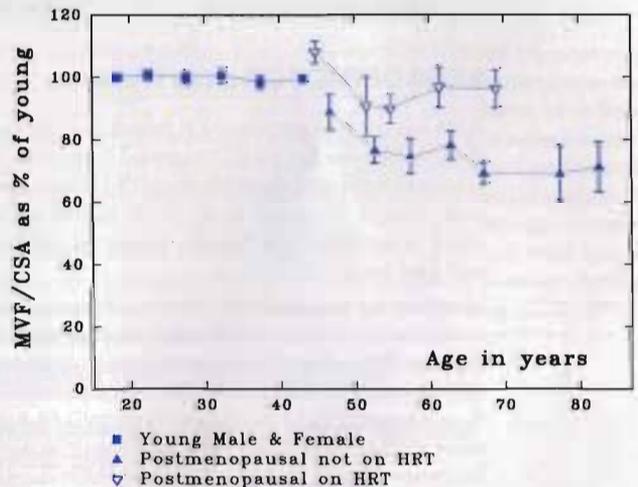
Dear Editor

We agree with Dr Bassey that the evidence that HRT increases force/cross sectional area (CSA) is not yet complete; indeed, that is why we are drawing attention, through the *Magazine*, to this work in progress. Also, we agree most strongly that we should all be careful to distinguish between force and force/CSA. For us force/CSA is the quantity of interest because it gives information about the function of the muscle's force developing system and whether it is influenced by hormones. Hormones are, of course, well known also to influence how much muscle there is, a matter of great importance to the individual, but not the subject of our investigations. The ratio of force/CSA can best be determined where there is a strong correlation between force and area, and no significant intercept in the relation between these two variables. These conditions are well satisfied by our work on *adductor pollicis*. The worry about changes in the ratio due to CSA increases caused by infiltration of muscle with fat *etc* is dealt with by our observations that the muscles concerned resist stretch normally even though weak. This could not be the case if a significant part of the CSA was non-muscle tissue.

Finally, the question of any conflict of our menstrual cycle data with earlier work will be addressed when a full account of this work is published.

Roger Woledge

Effect of Hormone replacement therapy on force-area ratio.



## GLOWING EMBERS

Dear Editor

The Chairman of the Benevolent Fund, Peter McNaughton, recently wrote a letter which referred to "the deceased embers of the Society". He later inked in an 'm'. I like the idea that our fiery Members of the Society glow as embers in their retirement, before being extinguished.

John Widdicombe

## CENSORSHIP OR QUALITY CONTROL?

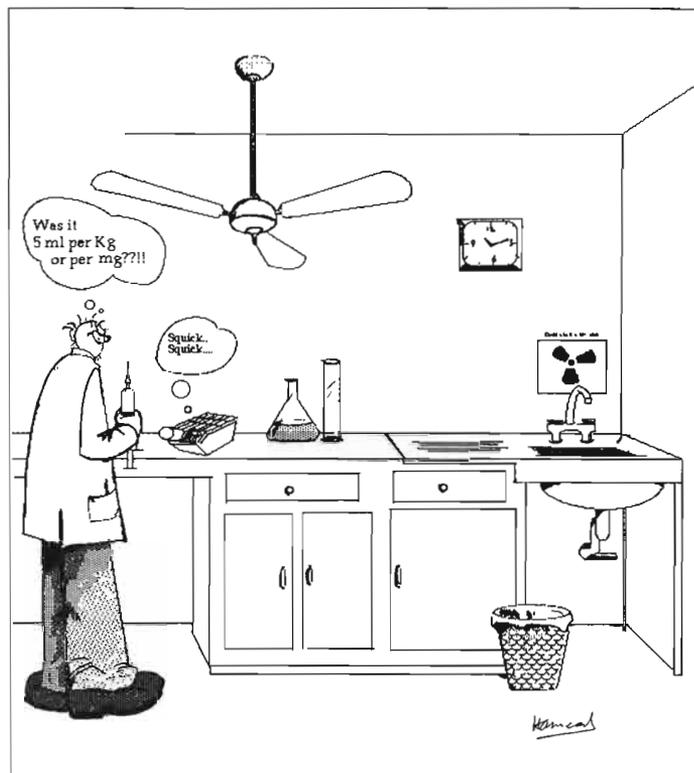
Dear Editor

I was dismayed to learn from the last issue of the *Magazine* that the Members of The Physiological Society had voted at the Cambridge Meeting not to publish papers by Harold Hillman and David Jarman. If a piece of work is shoddy, ill thought out and poorly performed, there may be a legitimate case for not publishing it. If, on the other hand, a study is carefully thought through and well executed, yet contradicts all orthodox thinking, rejection is not an appropriate response.

I have known Harold Hillman for many years and have found his views infuriating, controversial and disturbing. Equally, I have found his work to be performed with the utmost care. The methodology and the interpretations are invariably of a depth which puts most people to shame. Dr Hillman's work is suffused with a level of originality which most Members of the Society could not achieve in several lifetimes.

I frequently disagree with Dr Hillman but I have to admit that there is a real possibility that he may be right. The rejection of his work smacks to me of censorship rather than legitimate quality control. I have a suspicion that at some time in the future this episode will be revealed for what it is: a disgraceful attempt by the orthodox second rate to prevent what should be an open debate. The Physiological Society will not appear in a favourable light.

David F Horrobin



## UNIVERSITY OF DUBLIN TRINITY COLLEGE

**Lectureship in Physiology (Tenurable)**

**Lectureship in Physiology (5-year contract)**

**Lectureship in Physiology (3-year contract)**

Applications are invited from graduates in medical or biological sciences for the above appointments, which have been timed to coincide with the appointment of Dr Christopher Bell as Professor and Head of the Department of Physiology at Trinity College Dublin.

The Department has responsibility for teaching of physiology and histology to students of medicine, dentistry and allied health sciences and to students in the natural sciences. A particularly close relationship exists with the Department of Pharmacology and Therapeutics, and one of these Lectureships will involve teaching across the interface between these disciplines. All appointees will be encouraged to take an active part in development of computer-aided instruction packages.

Current major research themes in the Department include exercise and muscle physiology, metabolism, developmental biology and neurobiology (neurochemistry and membrane physiology). Applications will be welcome from candidates with research interests in these or in other areas. At least for the tenurable post, candidates will be expected to have a proven ability to attract independent funding.

The salary scale is IRL13,824 - IRL34,149 pa, and appointments are likely to be made within the range IRL13,824 - IRL19,508 pa, depending on qualifications and experience.

Application forms and further particulars may be obtained from the Establishment Officer, Staff Office, Trinity College, Dublin 2, tel +353 1 702 1678, fax +353 1 677 2169. Enquiries may also be directed to Dr Bell at the Department of Physiology, University of Melbourne, Victoria, Australia 3052, tel +613 344 5869, fax +613 344 5818, Email [chris\\_bell@muwaye.unimelb.edu.au](mailto:chris_bell@muwaye.unimelb.edu.au).

Appointments will be tenable from 1 October 1995 and completed applications must be received by Monday 9 January 1995.

Trinity College is an Equal Opportunities employer.

## OLD AGE, LESS STRENGTH

Based on a review given at the Society's Human Physiology research symposium on "The Physiological Consequences of Ageing in Adults" in December 1993.

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

### Strength and Muscle Mass

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

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

### Old Muscle

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

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

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

### Plasticity in Old Muscle

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

Recent controlled trials using oestrogen or growth hormone have shown no effect of these hormones on strength. Nutritional requirements for anabolic responses, however, are greater in old people compared to young.

In summary, there is evidence for an accelerating loss of muscle strength with age in late adult life, due in varying parts to irreversible loss of motor units and potentially reversible disuse atrophy of muscle fibres.

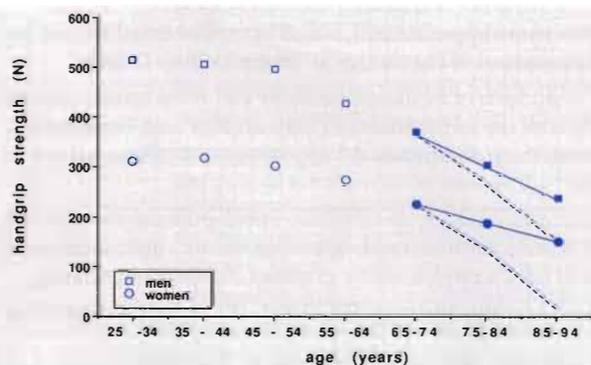
Joan Basse

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

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Fig 1



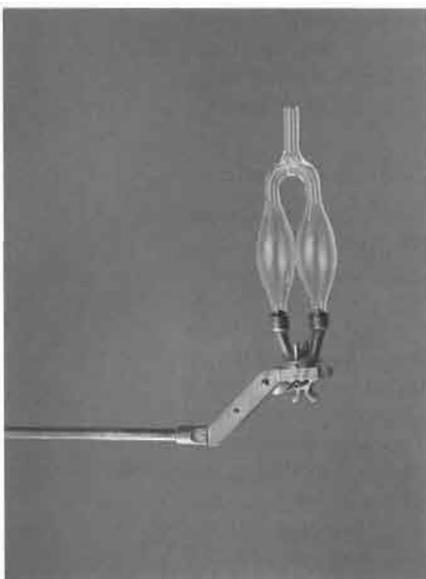
Mean changes by age group for handgrip strength from two separate representative surveys which used the same methodology and equipment. 900 men and women from the Allied Dunbar National Fitness Surveys (Sports Council, HEA, ISBN 1 872158 55 2, 1992) (open symbols) and 359 men and 561 women from Nottingham Longitudinal Survey of Activity and Ageing (Basse & Harries, 1993) (closed symbols). The dotted lines are longitudinal changes over four years. Cross sectional data can be upwardly biased by robust survivors in the older age groups; the longitudinal decreases were greater than predicted by the cross sectional data.

## MINERAL WITH ANIMAL CONNECTIONS

The mystery object from The Physiological Society's Collection at the Science Museum, which was presented at the Aberdeen Meeting in September, was Ludwig's stromuhr, a device for measuring blood flow and blood velocity in the main arteries of anaesthetised animals. Its name literally means "flow clock"; it has also been called a stream gauge and a rheometer but most references stick to the original German word. This particular one was brought to my attention by Mr Rod Adams of the Department of Physiological Sciences, University of Newcastle, and kindly donated to the collection by Professor Allen.

### Operation

The stromuhr consists of two glass bulbs, joined at the top and closed to the outside. At their lower ends they open onto a brass plate which is applied to an identical brass plate with matching apertures which end in canulae for insertion into the cut ends of the artery. The upper disc can be rotated on the lower disc by means of the knurled knob so that either glass bulb can receive the arterial inflow. In use, the first bulb is filled with oil and the second with defibrinated blood or saline. When the arterial clamp is removed, blood enters the first bulb, displacing the oil, which in turn displaces the defibrinated blood into the circulation. The bulbs are then rapidly reversed and the time noted. This procedure is repeated several times. Knowing the volumes of the bulbs means that the blood flow can easily be determined. From the diameter of the artery, and hence its cross sectional area, the velocity of flow can be calculated.



Photograph kindly supplied by David Exton, Science Museum

### Stromuhr History

Although known as Ludwig's stromuhr, the first publication (1867) giving details of the instrument is in the name of Dogiel, a Russian from Kazan. He was a guest worker in Ludwig's renowned laboratory at Leipzig but, despite Ludwig's typical courtesy to his guest, such was Ludwig's prestige that his name became attached to this instrument. Something similar had been described by Volkmann in 1850. It was merely a glass U-tube with taps, filled with saline and inserted into the course of an artery; on opening the taps the movement of blood into the tube could be measured. Ludwig's stromuhr was a great improvement since it allowed repeated and more accurate determinations to be made.

Later modifications, still on the rotating disc principle, were made by Tigerstedt (1891), who used a single tube containing a moving ball as a flow indicator, and

Hurthle (1903) who replaced the glass bulbs with a piston which allowed kymographic recording. There is a link, too, with more recent times: in 1929 Henry Barcroft designed a mechanical stromuhr in which electromagnetic arterial clamps, originally designed by Pavlov for his modification, automatically allowed a self-recording piston to move to and fro. Later, less invasive methods were devised: for example, that of Rein (1928), which measured blood flow from the temperature decrease downstream from a warmed area of the exposed artery. This is a different principle from that used by Ludwig and others but the device still reflected its ancestry by being called a thermo-stromuhr.

### References to Stromuhrs

Although long replaced as a method of measuring blood flow by more accurate, indirect methods, suitable for use in intact animals and man, it is interesting to note how long the stromuhr remained in the literature.

An early reference to it is in an account of the work of Dogiel in the *Lancet* of 1872, and it was mentioned in nearly all of the standard textbooks of the 19th century through to the 1950s. One wonders whether it would have been included by textbook writers for so long had it not borne the illustrious name of Ludwig. Rutherford, the first full time professor of physiology at King's College London, gave detailed instructions on the use of the stromuhr in his practical course in 1872 and it also appears in a number of manuals of practical physiology (Stirling, Broadie, Beddard, Schaefer) but it is hard to believe that it was used for teaching other than as an occasional demonstration.

It was offered for sale by the Cambridge Scientific Instrument Company in 1891, for the price of six guineas, and by Baird & Tatlock as late as 1938. The Barcroft model was made by C F Palmer & Co until at least 1940.

It is fortunate that this mystery object has such a well documented history. This is not always the case since from time to time the Science Museum acquires objects which defy even the erudition of your Working Party. Two such were candidates for the mystery object competition this time but, since it is helpful if **someone** knows the correct answer, they had to be withdrawn despite being interesting looking pieces of engineering. Perhaps Members with a taste for the obscure would be able to throw light upon Tata's neograph or Dr Caliburce's apparatus; history awaits your replies.

Alan Sykes

### References

Dogiel, J (1867) Die Ausmessung der stromenden Blut-volumina. *Arbeiten aus der Physiologischen Anstalt zu Leipzig*, 2: 196-271 (which is a reprint from *Berichte über die Verhandlungen der Königlich Sächsischen Gesellschaft der Wissenschaften zu Leipzig, mathematisch-physische Klasse*, 19: 200-275; either reference may be quoted by subsequent authors).



## THE STARVED GUT : WHY DIARRHOEA?

Intractable diarrhoea has been a known feature in human victims of famine or severe malnutrition for over a hundred years. Despite its long history and global scale, little progress in identifying its causes has been made, mainly due to obvious ethical difficulties in experimenting on severely starved humans. Yet, until we know the intestinal mechanisms involved, the best realimentation for the dietary deprived intestine cannot be developed. Injudicious refeeding of these severely malnourished can exacerbate rather than ameliorate the diarrhoea. Early suggestions of bacterial infection and overgrowth causing the diarrhoea were not supported by bacteriological evidence but a reduced absorptive function of the colon brought about by lack of bacterial fermentation products has been proposed from animal studies. Strangely, no investigations on the secretory functions of the small or large intestine had been attempted.

### Secretory Activity of the Undernourished Bowel

Over the last few years we have developed rat models to examine changes in the secretory activity of the nutritionally deprived or chronically undernourished bowel. We measure this activity either by monitoring the electrogenic ion transfer (short circuit currents) of the muscle-stripped (submucosal but no myenteric plexus) or intact intestine electrically *in vitro* or by estimating gravimetrically the fluid movement into the intestine *in vivo*. Enterocytes secrete ions and fluid into the lumen by mechanisms localised in their basolateral and luminal membranes. On the basolateral membranes  $\text{Na}^+\text{-K}^+\text{-2Cl}^-$  co-transporters transfer  $\text{Cl}^-$  ions from the extracellular space into the cell. At the luminal membrane,  $\text{Cl}^-$  channels allow the ion to move into the lumen, under the driving power of its concentration gradient and the negative intracellular potential. These channels are opened by various second messengers ( $\text{Ca}^{2+}$ , cyclic AMP or GMP) released intracellularly by secretagogues. Examples of secretagogues are the transmitters of the neural innervation of the enterocytes (acetylcholine, vasoactive intestinal peptide and 5-hydroxytryptamine), bacterial toxins (cholera toxin, *Escherichia coli* heat stable toxin STa), or the recently discovered intestinal peptide, the putative hormone guanylin, which has homology with STa. Practically all the secretagogues studied inhibit the absorption of NaCl as well as activating electrogenic  $\text{Cl}^-$  secretion, thus augmenting the fluid secreted.

The initial surprising discovery we made was that when rats were deprived of food for the first 24 hours secretagogue-activated secretion of the small intestine was unaffected, but if the food deprivation was extended for a further 24 hours the electrogenic and fluid secretion became enhanced and even more so in the subsequent 24 hours. These increases occurred despite the fact that nutritional deprivation decreases the number of enterocytes of the villi and crypts and despite the fact that the absorptive function of the intestine also becomes enhanced (Young & Levin, 1990). Clearly the movement of ions and fluid into the

intestinal lumen by the individual enterocytes from the nutritionally deprived intestine was much greater than those of the fed gut.

### What Causes the Hypersecretion of Enterocytes in the Intestine?

Initially we investigated whether there were (i) changes in the innervation of the enterocytes, (ii) changes in the affinity or number of their receptor sites and (iii) changes in their second messenger levels. We excluded (i) and (ii) because the hypersecretion still occurred after application of the neural blocker tetrodotoxin and with secretagogues like the  $\text{Ca}^{2+}$  ionophore  $\text{A}_{23187}$  or dibutyryl cyclic AMP that bypass the receptor sites. We did find, however, that the levels of cyclic AMP were significantly higher in starved enterocytes than in those from fed intestine. Other studies suggested that glucagon, which becomes elevated during starvation, may be one of the causes of the hypersecretory activity by raising the intracellular levels of cyclic AMP in the enterocytes. The cyclic AMP then selectively decreases the luminal membrane permeability to  $\text{Na}^+$  ions and the hyperpolarisation increases the electrical drive forcing  $\text{Cl}^-$  out of the cell (Levin, 1992), hence generating the hypersecretion.

### Chronic Undernutrition versus Starvation

To make the subject even more intriguing, chronic undernourishment of the rats, induced by feeding 50% of their control diet for 21 days, had a remarkably different effect on intestinal secretory function compared to simple removal of food. Secretion in the stripped intestinal preparation (submucosal but no myenteric plexus) was stimulated by the heat stable toxin (STa) of *Escherichia coli*. (This bacterium accounts for approximately 60% of all travellers diarrhoea and is a major cause of much childhood morbidity and mortality.) Not only was the electrogenic  $\text{Cl}^-$  secretion enhanced in the undernourished intestine as in the starved but the hypersecretion in response to the STa was maintained for as long as 60 minutes.

This contrasts with the transient response in fed and even the starved condition. The initial enhanced secretion was not sensitive to tetrodotoxin but its maintenance was. Thus, a neural path located in the submucosal plexus (maintenance circuit) is either induced or uncovered and activated by the reduction in food intake. The maintenance circuit could not be activated by any other secretagogue except serosally applied lipophilic analogues of cyclic AMP or GMP (Nzegwu & Levin, 1994a).

### Diet and Plasticity of the Enteric Nervous System

This plasticity of the enteric nervous system to dietary levels may be one of the causes of the exacerbation of secretory diarrhoea so often observed in malnourished humans. We had shown previously that STa in intact intestine from fed rats causes secretion through a myenteric plexus routed reflex via a C-fibre afferent path and an efferent supply with nitric oxide as its transmitter (Rolfe & Levin, 1994). This pathway is also present in the intact chronic undernourished intestine and influences the maintenance circuit in

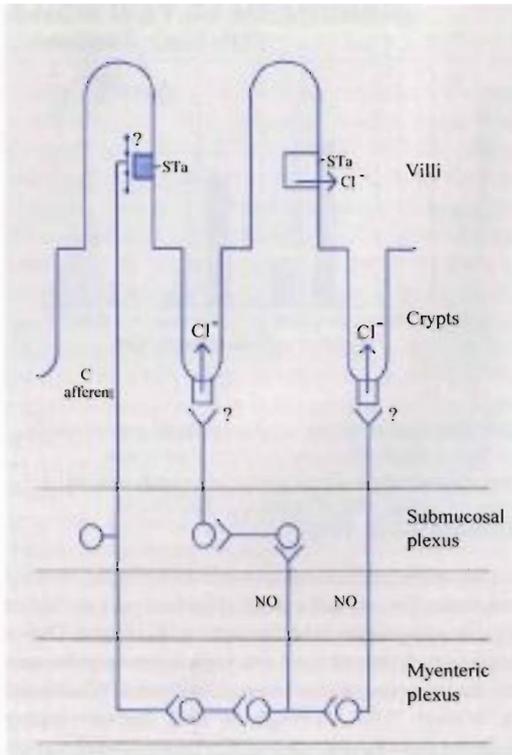


Fig 1

Diagrammatic illustration of the postulated dual action of enterotoxin E coli STa in activating electrogenic Cl<sup>-</sup> secretion in enterocytes in crypts and on villi described in the text. STa has a direct action on villous enterocytes by binding to guanylyl cyclase in the apical membrane and raising intracellular cyclic GMP that triggers the Cl<sup>-</sup> secretion. The indirect postulated neural action is mediated by STa attaching to a mucosal receptor cell (probably the enteroendocrine cell, shaded box) and releasing a chemical signal(s) which activates the underlying dendrites of C-afferent fibres. These capsaicin-sensitive nerves innervate the neurons in the myenteric plexus whose connections are mainly with the submucosal plexus and its motosecretory fibres to crypts (shown) and probably villi (not shown) although a few may innervate the crypt enterocytes directly (shown). These myenteric efferent fibres to the submucosal plexus and mucosa are nitrinergic as they contain the enzyme nitric oxide synthase which manufactures nitric oxide (NO) and are sensitive to blockade by L-NAME. A maintenance circuit for prolonging STa's action is induced in the submucosal plexus by undernutrition but it is controlled by the myenteric plexus.

the submucosal ganglion. We are trying to clarify the interrelationships between the myenteric and submucosal plexus in the undernourished gut. While the maintenance circuit is clearly located in the submucosal plexus and appears autonomous when there is no myenteric plexus present (stripped preparation), this autonomy becomes negated in the intact gut when the myenteric plexus is present. We can block the maintenance circuit by selectively inhibiting the afferent/efferent pathways of the myenteric plexus with either capsaicin or L-NAME (N<sup>o</sup>-nitro-L-arginine methyl ester) respectively, yet neither affect the maintenance circuit in the stripped gut (Nzegwu & Levin, 1994b).

One tentative - and no doubt simplistic - interpretation is that there is an inhibitory path in the submucosal plexus that the myenteric plexus inhibits to allow the maintained duration to be expressed. However, the enteric nervous system is complex - it is not called the "little brain" for its simplicity! We are just beginning to experience its complexity. While it poses a fascinating intellectual and experimental challenge for future studies, at the same time we hope that its unravelling will give rise to efficacious treatments for the diarrhoea of famine and undernourishment.

Roy Levin  
Dept of Biomedical Science  
University of Sheffield

This work was supported by the Wellcome Trust.

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**WHITE CELL INVASIONS OF THE OVARY**

The testes are privileged - at least as far as the immune system is concerned. Not so for the ovaries: they are not immunologically privileged and there is a busy traffic of white cells through these glands with rush "hour" occurring during the periovulatory period. Thus, the number of leucocytes in the ovary varies according to the stage of the oestrous or menstrual cycle. Now there is good evidence that these cells and their cytokine secretions play an important role in normal ovarian physiology.

There are always macrophages, mast cells and eosinophils in the ovarian stroma and/or around the follicles but as ovulation approaches the number of these cells increases. Then, within hours of the preovulatory LH surge, there is a massive invasion of macrophages and neutrophils around the blood vessels of the *theca interna*. By the time ovulation has begun the number of macrophages has increased fivefold and neutrophils eightfold. This migration continues during the formation of the *corpus luteum*.

**Attracting the white cells**

So how and why does the ovary attract all these leucocytes? There is some evidence that the ovary produces chemotactic substances but these remain ill defined. Alternatively, cytokines themselves, such as interleukin (IL)-1, tumour necrosis factor (TNF)-α and granulocyte-macrophage-colony stimulating factor (GM-CSF) are possible chemotactic candidates; in other parts of the body they have been shown to stimulate leukocyte chemotaxis. However, the source of cytokine production in the ovary remains uncertain. Some studies show that thecal cells of the follicle may synthesise cytokines, while a more likely source is, of course, the resident ovarian macrophages or other leucocytes.

### What role for cytokines?

Since cytokines are one of the major secretory products of immune cells and are important signallers in the cascade of events that follow an immune challenge, many studies have looked at the effects of these chemicals, particularly IL-1 $\beta$  and TNF- $\alpha$ , on steroid production in cultured ovarian cells. A picture is emerging from a somewhat confused literature and a generalised scheme has been proposed (see Norman & Brannstrom, 1994). During follicular development cytokines inhibit differentiation and steroidogenesis but promote growth of the follicle. After the LH surge, they stimulate progesterone, androgen and prostaglandin secretion and play an important role in the cascade of events preceding ovulation. This process has been likened to an inflammatory response and involves increased vascular permeability and ultimately breakdown of the follicle wall. In fact, the rate of ovulation in isolated LH-stimulated rat ovaries can be dramatically enhanced by the addition of leucocytes in the perfusing medium (Hellberg *et al*, 1991). Finally, during formation of the corpus luteum from the ruptured follicle, cytokines continue to stimulate progesterone production and may help to promote tissue remodelling.

This may be a somewhat simplified picture and obviously such pharmacological experiments preclude both the possible effects of other factors released by leucocytes and the importance (if any) of cellular communications between white cells and ovarian cells. An alternative approach is to co-culture leucocytes with identified cell types of the ovary.

### Culturing in sin

Macrophages can be easily isolated by their ability to adhere to the base of culture wells within two hours of plating and peritoneal fluid provides an easy source of these cells. Co-cultured macrophages (see Fig 1) exert powerful inhibitory effects on progesterone production in granulosa cells obtained from developing follicles (Shakil & Whitehead, 1994) - an effect which was enhanced when macrophages had been pre-activated with thioglycollate broth but not,

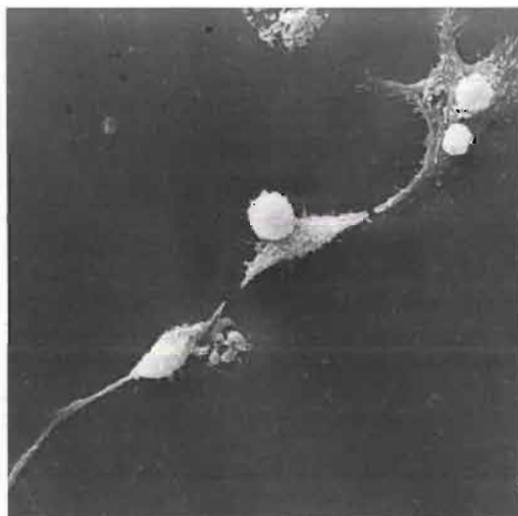


Fig 1 Scanning electron micrograph of macrophage/granulosa cell co-culture. Bar = 10 $\mu$ m

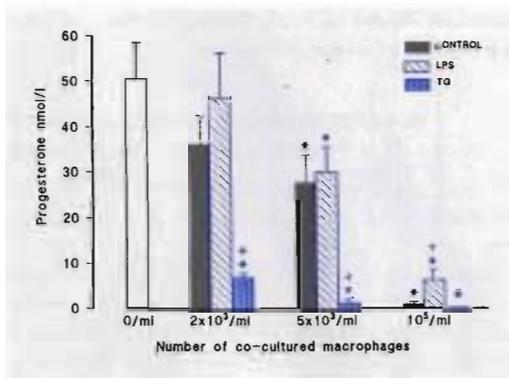


Fig 2 Inhibition of progesterone secretion from rat granulosa cells co-cultured with increasing numbers of peritoneal macrophages obtained from untreated animals (control) or those pretreated with either thioglycollate (TG) or lipopolysaccharide (LPS).

intriguingly, with the endotoxin LPS (Fig 2). Further evidence for cell-cell communication was provided by the observation that bioactive IL-1 $\beta$  and TNF- $\alpha$  secretions from cultured macrophages was enhanced by the presence of granulosa cells (Shakil, Whitehead & Wilson, 1992). Perhaps, *in vivo*, the developing follicle promotes the release of cytokines from ovarian macrophages; in turn, these cytokines attract the pre-ovulatory influx of other leucocytes. Indeed, Brannstrom *et al*, 1994, showed that the rat ovary produces IL-1, IL-6, TNF- $\alpha$  and GM-CSF prior to and during the ovulatory process.

### Coming of age

It has been known for over 20 years that immunoincompetence (neonatal thymectomy) and later immunosuppression (anti-thymocyte serum) can disrupt normal ovarian function. More recently, both immunosuppression with cyclosporin and immunostimulation with LPS were shown to alter hormone secretions from the hypothalamic-pituitary-ovarian axis and inhibit oestrous cyclicity (Shakil *et al*, 1994). Now research is focussing more on the local interactions of immune cells with ovarian cells and clearly both leucocytes and their cytokine secretions must be considered along with the more established actions of pituitary gonadotrophins and the intra-ovarian growth factors. Little is known of the clinical relevance of immune/ovarian crosstalk but it may be an important consideration in the aetiology of premature ovarian failure, polycystic ovarian syndrome and infertility associated with infections and immune activation.

Saffron Whitehead

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## A NEW WAY OF MEASURING CARDIAC OUTPUT

Existing methods of measuring cardiac output are unsatisfactory. Non-invasive methods such as Doppler and thoracic impedance are inaccurate, although they may be useful for showing relative changes. Fick and indocyanine green dilution are more accurate but impractical in a routine clinical setting. The most commonly used method is thermodilution using a Swan Ganz catheter which has a thermistor near its tip and is passed via a central vein through the right side of the heart into the pulmonary artery. Cold dextrose is injected into the right atrium via one port of the catheter and the fall in temperature in the pulmonary arterial blood recorded as the indicator dilution curve. Complications due to Swan Ganz catheters include perforation of the right ventricle, damage to the tricuspid and pulmonary valves, tamponade, rupture of the pulmonary artery, knotting of the catheter and septicaemia due to catheter associated sepsis. In addition, insertion of the catheter may be difficult or impossible in some patients and the measurement may be inaccurate under some conditions such as low cardiac output or tricuspid incompetence.

We have developed a new indicator dilution method using lithium chloride as the indicator. Lithium chloride is injected into a central vein and  $[Li^+]$  is detected in the arterial plasma by withdrawing arterial blood past a lithium selective electrode. The electrodes have been specially developed so that they have a rapid response time and are unaffected by plasma proteins. The voltage across the membrane of the electrode is related via the Nernst equation to plasma  $[Li^+]$ . The signal is passed through an isolating amplifier and A/D converter to a portable computer.

$$\text{Cardiac output} = \frac{\text{LiCl dose} \times 60}{\text{area} \times (1 - \text{PCV})} \text{ l.min}^{-1}$$

where the LiCl dose is in mmol, area ( $\text{mmol.l}^{-1}.\text{s}$ ) is the area of the lognormal curve corresponding to the data as far as a point well short of recirculation (this is the area under the curve which would have been obtained

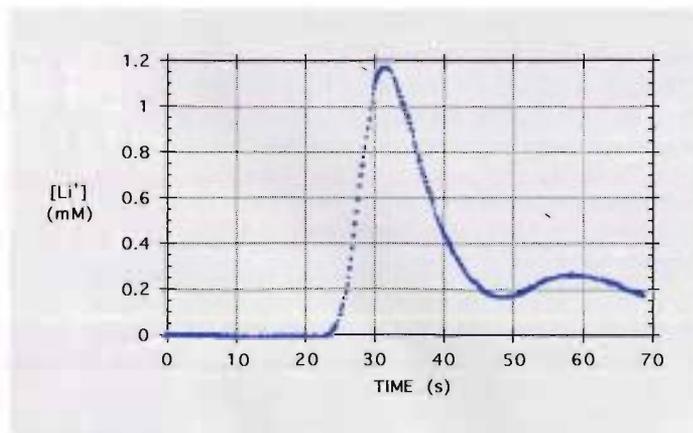


Fig 1 Arterial plasma lithium in a subject following intravenous injection of 0.45 mmol LiCl. The filled squares indicate the data points recorded at 0.2 s intervals. The cardiac output was 2.9  $\text{l.min}^{-1}$  (cardiac index = 1.9  $\text{l.min}^{-1}$ ) and the rate of withdrawal of blood past the sensor was 4  $\text{ml.min}^{-1}$ .

if there had been no recirculation of the indicator), PCV is packed cell volume calculated as haemoglobin concentration divided by 33 (this correction is needed as LiCl is distributed in the plasma).

Fig 1 shows an example of a lithium dilution curve recorded in a patient who had undergone coronary artery bypass surgery.

This method is still being developed but has the advantages of being safe (it is minimally invasive since most of the patients needing cardiac output measurements already have arterial and central venous catheters in place), simple, quick to perform and probably more accurate than thermodilution. It could also be adapted for use in neonates and small animals.



David Band & Robert Linton  
Applied Physiology, The Rayne Institute,  
St Thomas' Hospital, London

### Reference

Linton, R A F, Band, D M & Haire, K M (1993) A new method of measuring cardiac output in man using lithium dilution. *British Journal of Anaesthesia* 71: 262-266.

### NORTHWEST AIRLINES TRAVELLING FELLOWSHIPS

Northwest Airlines have agreed to provide three Northwest Airlines Travelling Fellowships to The Physiological Society to encourage and enable academic biomedical interchange between the UK and USA.

The Fellowships are aimed at young research workers (up to and including lecturer level) who wish to visit a centre of excellence in the United States. Travel must be made between 1 October 1995 and 31 March 1996.

These Fellowships will be awarded to young Members or Affiliates by the Grants Sub-Committee, in conjunction with Northwest Airlines. For ease of administration, candidates will be considered in conjunction with the Rushton Fund and Affiliate Travel Grant Scheme. These Fellowships are considered particularly prestigious, being awarded to those applicants achieving the highest ranking.

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*"What higher education courses are available in physiology in London?"*

ECCTIS is a database of higher education courses in the UK, enabling the searcher to find information by subject, location and organisation among other criteria. The Information Service's growing collection of course and careers information provides more in-depth coverage.

*"Please provide me with some contacts for research on muscle relaxants"*

Searches of two databases, Current Research in Britain and Who's Who in Science and Technology, provide helpful answers to this query. The former describes ongoing research projects, while the latter includes profiles, including career details and professional interests, of leading scientists worldwide.

*"Can I have some very general introductory information on the digestive system?"*

The Information Service has an extensive collection of human biology books aimed at a lay audience. Other media offering fully illustrated coverage are posters and videos.

*"Have you any data on the ethical aspects of using animals in medical research?"*

The Bioethicsline database focuses on ethical aspects of medical research, with details of almost 1,000 publications on animal experimentation. Press coverage can be tracked by searching recent years of the daily newspapers on compact disc (CD-ROM), while the Information Service Associations File contains the viewpoints of a number of organisations concerned with this issue. In addition, there are currently over 170 books on this topic in the Information Service.

*"Are there any computer programs to aid physiology teaching?"*

The Service is building a collection of computer-assisted learning (CAL) materials for evaluation by teachers of medicine. PharmaCALogy, a collection of more than 50 programs designed for use in pharmacology and physiology undergraduate courses, has recently been installed.

## Future Developments

The major immediate priority is to make the job vacancies database accessible via JANET. Negotiations have also begun with the Ciba Foundation to collaborate in providing access to its database of forthcoming medical meetings available through JANET. Personalised current awareness services for individuals interested in specific topics within the subject of the Service, eg medical ethics, science policy, public attitudes to science, will also be provided on request. Another key area is the promotion of the use of tools which can bring greater efficiency to the process of medical research. One example of the latter is the use of computer networks, notably the Internet, through which medical research is increasingly communicated. Another is software for information management, eg Reference Manager. Information Service developments are described in a quarterly newsletter, *IS News*. Please contact the enquiries service (details at end) to receive a copy.

## At Your Service

Visitors are welcome during the opening hours of 9.45 am to 5.00 pm from Monday to Friday (except bank holidays). The Service is based on the upper ground floor of the Wellcome Building at 183 Euston Road, London (almost opposite Euston station). Alternatively, an enquiries service is provided by: phone (0171) 611 8722, fax (0171) 611 8726 or Email (wellinfo@uk.ac.ucl).

*John Cox*  
Head of Information Services  
Wellcome Centre for  
Medical Science



Wellcome  
Information  
Service



## Science graduates and salaries on the increase - just

Provisional details from the Department for Education of the examination results and first destinations of higher education graduates from institutions in England indicate a slight rise in those achieving qualifications in science compared with five years ago. The mean starting salary between May 1993 and February 1994 had increased slightly to £12,647.

*Outlook on Science Policy* October 1994, p 102-103

Source: SPIN

## Prime time to remember ...

An editorial recalls John Major's commitment in February to spend more on the UK science base and contrasts this with the fall in resources planned for the Higher Education Funding Councils (by £24m to £1.92bn over the next three years) and the expectations being placed on the Technology Foresight Programme, which may mean less basic and more applied research.

*New Scientist*, 22 October 1994, p 3

### WHY ARE THERE SO FEW WOMEN IN SCIENTIFIC RESEARCH?

Report of a pilot study commissioned by the Wellcome Trust.

The past year has seen a surge of interest in the problems facing women in science. Although making up almost half of all science graduates, the number of women who succeed in climbing the research ladder remains stubbornly low. At each stage in the academic career path, the proportion of women declines and most women working in science are in junior grades. In 1992, for example, women made up only 16% of academic staff in science departments and fewer than 3% reached professional level<sup>1</sup>.

Concern about this imbalance has grown. The high drop out rate represents a waste of skills at a time when government and industry are increasingly concerned about the decline in the popularity of science. The government has now agreed to establish a development unit based at the Office of Science and Technology to encourage women to stay on in science. But why do so many women leave?

Much of the debate is based on anecdotal evidence. A lack of role models, active discouragement from teachers or tutors, a lack of confidence among women and the male dominated culture of university departments have been put forward as factors. But very little data exist to support these opinions. In an effort to find out more about the issues which influence career choice, the Wellcome Trust commissioned a pilot study to look at the attitudes of undergraduates

and postgraduates to careers in research<sup>2</sup>. Based on interviews and a questionnaire survey of 130 students in Leeds and Cambridge, the study aimed to highlight factors that may be dissuading women from entering a science career.

The findings confirm that most women were motivated to study science by their interest and enthusiasm for the subject and the majority expected to make their careers in science. But several factors taken together made research relatively unattractive as a future career. Chief among these was the ethos surrounding academic research where poor conditions of employment and an uncertain job market are accepted as the norm. Women were more likely than men to think that scientists worked long hours, leaving little time for other interests, and the nomadic lifestyle associated with establishing a career in research was not seen as compatible with family life. Compared to the men in the survey, women were less willing to do research that was defence funded or involved animal experimentation. They were more likely than men to want to work in areas that involved contact with people and more inclined towards work with clear practical applications. The most important factor in encouraging women to take up careers in research was a stimulating first degree course; however many were dissatisfied with aspects of their undergraduate courses, describing them as boring, irrelevant and badly taught.

Contrary to expectation, most women did not believe that they need role models to succeed in scientific research. Nor was any evidence found of a lack of

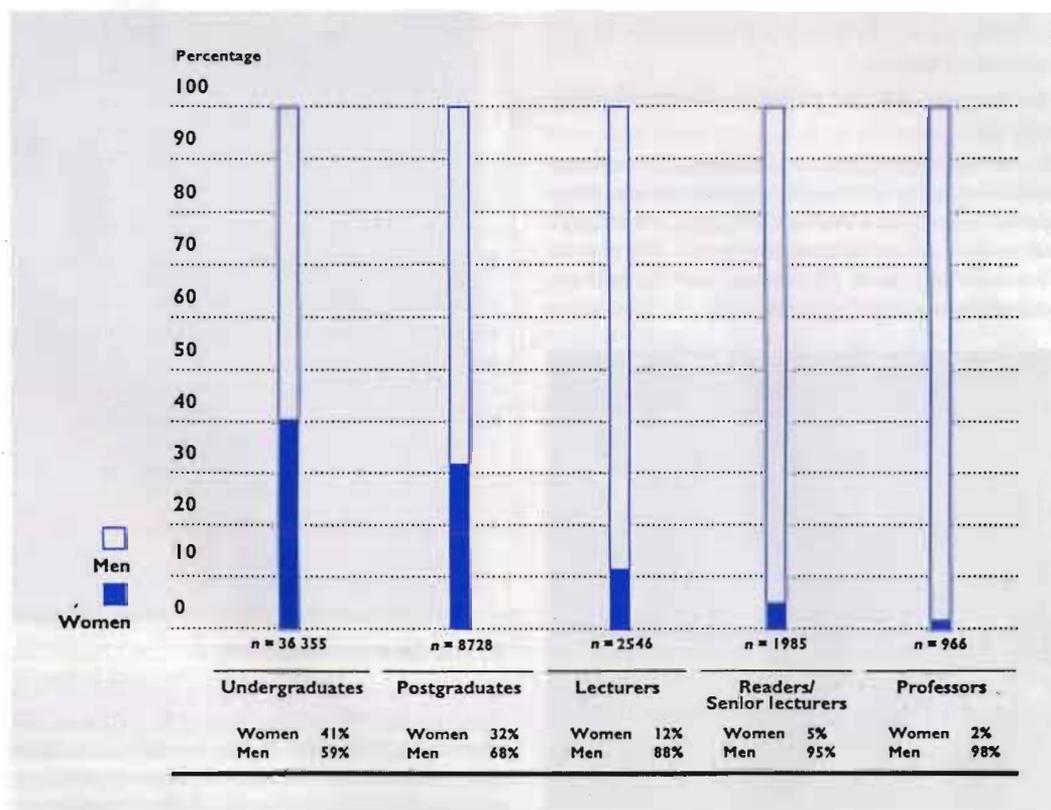


Fig 1  
 Personnel in universities-physical and biological sciences 1992-1993  
 Source: University Statistics 1992-93, Vol 1: Students and Staff, Universities Statistical Record.

confidence among the women in the study or of any active discouragement from teachers or tutors. But many claimed difficulty in being taken seriously in a male dominated profession. The imbalance in number at staff level effectively cast them in the role of outsiders. In this context, it is possible that the traditional way forward for aspiring scientists, namely mentoring by senior scientists, does not favour women.

The reasons for the shortage of women in science are complex and more research is needed to unravel the issues further. But some of the problems high-lighted

in the study could be addressed by funding bodies and universities. In particular, closer attention to the structure and content of undergraduate courses and more widespread provision of part-time working and career breaks could start to change the culture of academic research in favour of women scientists.

*Mairead O'Driscoll*



**The paradox of critical mass for women in science**

A study of 30 academic science departments found that as the number of women faculty members increased, distinct subgroups formed which could be at odds with each other, hampering the attainment of a "critical mass" which can bring about improvement in conditions.

*Science*, 266 7 October 1994, p 51-54

Source: SPIN

**References**

- 1 *University Statistics 1992-93, Vol 1: Students and Staff*, Universities Statistical Record.
- 2 O'Driscoll, M & Anderson, J *Women in Science - attitudes of university students towards a career in research: a pilot study*. PRISM Report No 4. The Wellcome Trust, London.

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## THE NEW BIOLOGY OF HUMAN REPRODUCTION ACCORDING TO UNDERGRADUATES

The inexorable shift in university examinations from essay and written answers to the ticks or crosses in the boxes of multiple choice questions endangers the survival of one of the few pleasures for the academic examiner - the student bloomer or howler. Over the many years of examining medical, dental and science undergraduates on reproductive physiology, these have enlivened the occasional answer. Not wanting to see these marvellous student creations vanish, I collected them for a greater public. When placed together they make a fascinating new biology of human reproduction.

Here then is a world of novel spellings, neologisms, biological fantasy, conjecture, make-believe and half remembered concepts but, above all, a world of unconscious humour. Just in case anyone has difficulty in understanding the student as opposed to the real world concepts, the latter are shown immediately after in brackets.

### A New "Dickshonary" of Sexual Anatomy

Some students appear to have real trouble with their spelling, creating wonderful new sexual terms, viz: "the mouth resembles the vuvla [vulva]", "the cliotre [clitoris] is possessed by females to attract males", "to be a male you have to have a pinus [penis] and a vergina [vagina] to be a female", "men often show a penal [penile] bulge"! We have men with "pituatrys [pituitaries] and women with ovorys [ovaries] and brests [breasts]" while the "genda [gender] of men and women can be distinguished because they show hormonal [hormonal] sex which is always given on their birth certificites [certificates]". The final act in pregnancy, parturition, is "aided by contraction of the woman's abbominabel [abdominal] muscles".

### New Concepts of the Menstrual Cycle

The menstrual cycle comes in for its fair share of invention. In one description "the endometrium becomes oedentulous [oedematous] fluid and loose". In another "the corpus luteum is the follicle which is released at mensuration [menstruation] which has collapsed and formed a partially closed structure". It is nice to know that "the menstrual cycle is the controlling cycle in the reproductory process in human and other arthropods". Now that one I really had trouble understanding until years later a zoologist suggested that the student probably meant "other anthropoids"! My fantasy of crabs and lobsters partaking of menstruation under water was finally exorcised.

We are told that "the menstrual cycle does not appear in males, many theories have been put forward to explain why not", perhaps the simplest reason is "their penal sex hormones". The menstrual cycle "can be interfered with by malnutrition or nerves which gives rise to anuria [amenorrhoea] - an inhibition of a period". In another concept "menstruation is when the placenta is voided". I would not be too surprised if that gave rise to anuria!

### Problems with Pubarche

"Menarche" we are told "is the period before puberty". Puberty has its smiles - "puberty can be described as the first menopause [menarche]", "puberty is when body hair under the anus begins to appear", "puberty appears to be a time when indiscriminate sex occurs for there is a release of a blocking factor that gives rise to promiscuous [precocious] puberty". Not to be outdone by the known developmental changes during puberty of pubic hair, menses and breast development labelled pubarche, menarche and thelarche, my creative students offered "tetrarche, gonarche and techlarche" - three wonderful new terms crying out for developing sexual systems yet to be discovered. A new pubertal phenomenon, an insect phase, occurs in our male because according to one student "testosterone promotes the development of the testes at puperty, called puparche".

It is not too surprising to have a difficult sexual development when "sex hormones are produced by the ovaries in the female and the penis in the male" or "at 6 weeks both males and females have indifferent testes [gonads]". We are assured by another that "the testes gives rise to the male external genitalia". Possible mechanisms involved in the resetting of the hypothalamus at puberty are claimed to be "i) sunlight and ii) changes in hormones secreted by the genitals". "Axial [axillary] hair" is also claimed to develop at puberty. A female science student reported "that testosterone has an effect normally resulting in the standard male genitals we all know and love". I am fascinated to think what non-standard male genitals look like.

One student had a dismal anatomical outlook for older women, "the sexual glands of women at menopause regress, breasts lose their shape and become baggy and empty". Not much joy in that scenario. Interesting variants on the cessation of ovarian function were that "menopause occurs in women when the ovary [ovum] is no longer released" and that "the massive drop in oestrogens that occurs at menopause is due to the follicles wearing out".

### Mass Hysteria or Mass Ovulation

Ovulation was multifaceted. In one answer "follicles burst in a slow ordered manner" in another "about 400,000 follicles start off but only one succeeds in reaching the outside, old follicles and all those which did not fully mature then go yellow and form the corpus callosum [luteum], this secretes large quantities of oestrogen". A remarkable analogy was created in one answer, viz: "mass hysteria is well known but mass ovulation is perhaps not too well known although one would have us believe that about 400,000 follicles start off but only one succeeds in reaching the outside".

To find out if a woman has ovulated "one looks at the ovary using a laboroscope [laparoscope] for fresh corpora albuginea [albicans] which indicates ovulation has recently occurred". Other more (or less?) fortunate women will know about their ovulation because "as the ovum ruptures from the ovary some women may be able to feel this through the abdominal wall".

Modern technology has come to the aid of assessing whether a woman has ovulated for "Ultrasound [ultrasound imaging of the growing follicle] is now being tried out to assess ovulation - as far as I can remember it involves listening to the sounds generated as the follicle ruptures and the ovum moves along the fallopian tube". Now that surely is ultrasound! "In menstruation", we are informed, "ovulation occurs about mid cycle". "Ferning [of the cervical mucus] is also present maximally at ovulation, this is a patterning of the vaginal wall to form channels which the sperm will be directed up. LH and FSH then act upon the ovum to ripen it and if it is not fertilised it bursts. What is left of the ovary after release of the ovum forms the corpus luteum". After that scenario is anyone surprised that "some women get menstrual pains when they ovulate". The corpus luteum, according to one student, "is held in place by progesterone", clearly a hitherto undiscovered adhesive property of the hormone. In the words of another "it is the ovary that has not been fertilised". In one terse explanation "the corpus luteum is the ovum when it is shed" and in another "if fertilisation of the ovum occurs the placenta is formed and the ovum implants into it".

"Mucus is very sticky at preovulation, it can act as a plug preventing sperm entering the vagina". No wonder some men fear not so much the *vagina dentata* but the *vagina captivus*!

### The Miracle of Birth

Fascinatingly we are told that "Parturition is a multifactorial process and not one single mechanism is responsible". Childbirth according to that student is truly a miracle. For another the mechanism is complicated viz: "the contractions of the uterus cause a negative feedback on the hypothalamic anterior pituitary system caused by a fall in HCG secreted by the endometrium. This creates a fall in the progesterone secretion of the corpus luteum and the endometrial breakdown is also a cause of parturition". While appreciating that the birth process is often painful the notion that "the placenta will burst before the baby is to be born thus acting as a regulator" certainly adds to the folklore of its difficulty.

### Size and Age

In an ever shrinking world it is not surprising that males become worried about penile size when one student described the phases of male human sexual arousal designated by Masters and Johnson as "Excitation, Arousal, Plateau and Diminution" [Resolution]. In relation to women, their sexual stimulation could become painful as "Masters & Johnson proposed that the ovum [ovary] may also become vasocongested as sexual arousal occurs."

Finally, in these days of equal opportunities and political correctness, it is sad to note that "menopause does not affect men, they can help to achieve conception up to death". This puts a whole new perspective on deathbed scenes. It seems that there are some factors in reproductive biology that feminism will never overcome!

Roy Levin  
Dept of Biomedical Science  
University of Sheffield

### WINE TIPS MIXED WITH CHRISTMAS LUNCH

It is always difficult to achieve the correct balance when choosing wines for Christmas, unless, of course, one is a guest and then it becomes no problem at all. My first suggestion is to go to someone else's house and let them do the worrying. If this plan cannot be met and you are well and truly stuck, it is necessary to do some analytical work on the guests. Invariably there are at least three generations to cater for and, in these days of longevity, four may not be a rarity.

Take my situation, for example. There is mother, hard to please at the best of times although she did raise a smile two Christmases ago. Then mother-in-law who, three years ago after an over enthusiastic assault on the preprandial champagne, fell asleep at the lunch table just as the cranberry sauce was being added to her plate. Some guests may even prefer some other alcoholic beverage to wine - my beer loving brother, whose deep rooted suspicion of the vine manifests itself by a greeting such as "Couldn't resist this Youngs promotion. You might like to try some too". Finally come the teenage children who are just on the verge of vinous initiation.



Champagne is the obvious choice to start things off on the right foot but a good sparkling white wine is a cheaper alternative. There are plenty of examples on the market nowadays emanating from the far flung corners of the globe. Australia and New Zealand, America, even India produce a very acceptable glass of festive fizz. A further consideration here is that if one is faced with the problem of guests overimbibing before the party has started then create a "Buck's Fizz". Just add good fresh orange juice in roughly equal proportion to the sparkling wine. The swigging teenagers are unlikely to suffer any ill effects with this drink.

Then comes the choice of wines to accompany the meal. The great thing about turkey is that you can drink red or white with equal satisfaction and to save argument I provide both and let the guests choose. Good wines are made the whole world over nowadays, as we have already discovered with the sparklers. Therefore don't be afraid to take a "global view" when making your selections. Why not try something from South Africa or Chile, Bulgaria or Argentina as an alternative to the more traditional wine-making areas? A little vinous "homework" beforehand will pay dividends or else take the advice of a reputable merchant, who should be happy to help.



One advantage of so many new wines now appearing is that the majority are classified on the label by the constituent grape variety. This considerably simplifies selection once you know which grape variety suits your personal taste. Chardonnay is possibly the best known of the white grape varieties. It is the classic grape of white Burgundy and seems to be grown just about everywhere now. It has a fruity, some say "buttery" flavour which can make it very appealing. It is also very interesting to contrast the styles of different chardonnays - oaked and un-oaked, for instance, are vastly different in character and flavour. Another common white grape is the Sauvignon Blanc. This grape has undergone a revolution in the past decade. Previously, except for a few superb and usually expensive examples, it produced a fairly dull commodity. Now, thanks to a combination of new technology and "avant-garde" wine-making, largely from the antipodes, it makes a lovely glass of clean, fresh and fruity dry wine.

The same principles of grape variety apply to red wine. Therefore, if you see Cabernet Sauvignon or Merlot on a label just think of them as the main

varieties used in the making of Red Bordeaux or "Claret", as it is more popularly known. Again there are many varieties and styles to choose from but for Christmas lunch I would tend to go for something light and fruity rather than big and heavy. Mainly because the day is still young and a more alcoholic wine may do no favours toward maintaining family harmony throughout the day.

Gamay, the variety of Beaujolais, springs immediately to mind or the more adventurous might like to try a young Zinfandel - an interesting variety grown in the United States. As an alternative, the Pinot Noir is a delicious grape. Its traditional home is Burgundy but now there are many good and less expensive examples appearing from countries as different as America and Tasmania.

With the main course safely negotiated, you can introduce a touch of novelty with a dessert wine for the Christmas Pudding in the form of Australian Liqueur Muscat. This fortified wine is unique to Australia, dark coloured with intense sweetness. It is a remarkable example of modern winemaking. *Bon appetit.*

Nick Davies

In a biology examination, candidates were asked to compare inbreeding with outbreeding. One answer (which I saw), began: "In inbreeding you absorb oxygen, in outbreeding you give off carbon dioxide"

Vernon Pickles  
Oxford

As part of a SAQ, students were asked to name erythropoietin's target organ. One answer was "the erythron".



### CAPTION CONTEST

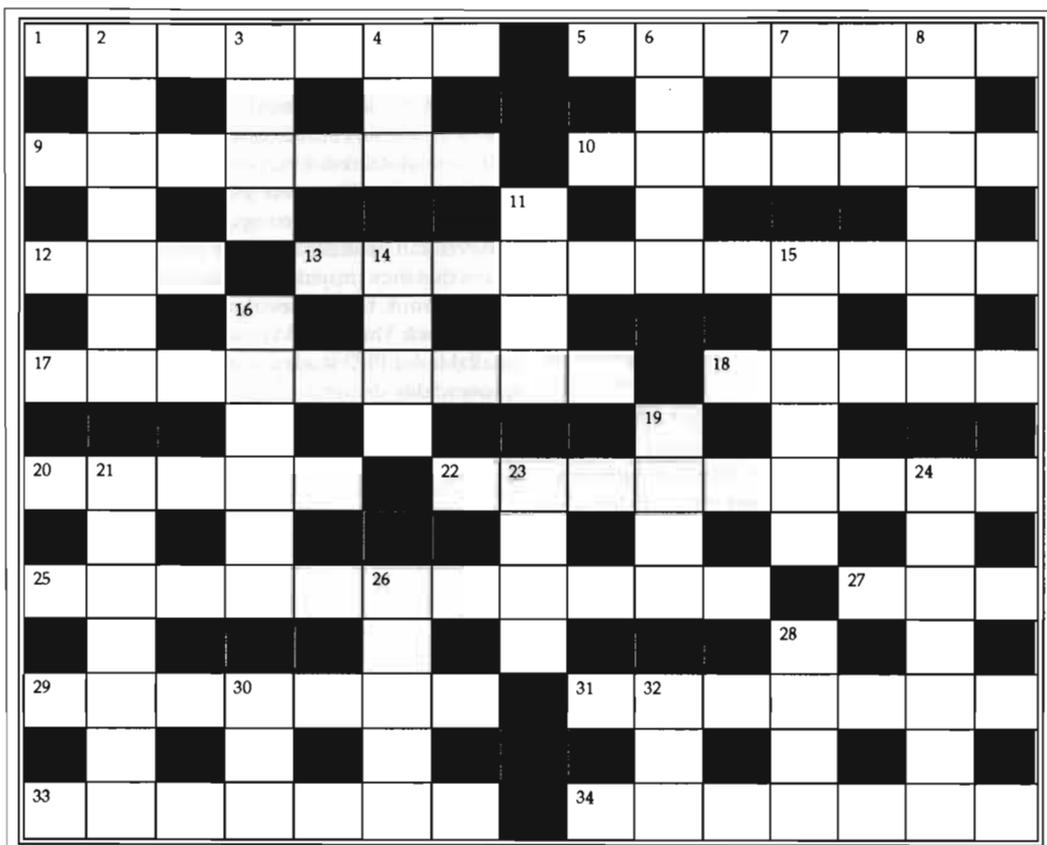
A bottle of wine will be awarded to the person who, in the opinion of the judges, submits the most amusing caption for either of these photographs. Entries should reach the following address by 12 January 1995:

Saffron Whitehead (Caption Competition)  
Department of Physiology  
St George's Hospital Medical School  
Cranmer Terrace  
Tooting  
London SW17 0RE

Why are these men laughing?



CRYPTIC CROSSWORD



Entries to reach Heather Dalitz at the Administration Office, The Physiological Society (Crossword), PO Box 506, Oxford OX1 3XE by 6 January 1995. A prize will be awarded for the first correct solution drawn.

**Across**

- 1 French have it every day, physiologists only twice a month. (7)
- 5 Stratum of epidemiological study. (3,4)
- 9 Prize - or arduous duty - for upstanding physiologist. (7)
- 10 Electronmicrograph is an extreme example. (5,2)
- 12 Funding body initially made real contribution. (3)
- 13 Great physiologist amazingly errs in nothing. (11)
- 17 Studies structure of defence mechanism, in a fog (9)
- 18 Research resource in form one yearns for. (5)
- 20 One of Physiology editorial group is dissatisfied, we hear. (5)
- 22 Life forms seen when I'm on grass, spaced out. (9)
- 25 Site of neurological investigation. (5,6)
- 27 Carries messages down the line and back. (3)
- 29 A murder perpetrated in tympanic membrane. (7)
- 31 Hippy ICI cast out? (7)
- 33 Fizzy Diet Pepsi is not made from amino acids. (7)
- 34 Juggling garnets - odd clue out. (7)

**Down**

- 2 Common practice in PhD theses. (7)
- 3 Stare endlessly down at experimental subjects. (4)
- 4 IRA disastrously produces gaseous mixture. (3)
- 6 Article from chaotic loggia supplies apparatus. (5)
- 7 Conductors on route. (3)
- 8 None takes Europe to heart - what nerve! (7)
- 11 Members of body supporting researchers. (4)
- 14 We give blood, that man and I. (4)
- 15 Goblin found dancing in blood. (6)
- 16 Bad 'arvest, suffer loss of nutrition. (6)
- 19 Determining gender is a barrier, right? (4)
- 21 Tortures of love at University initiate reproduction. (7)
- 23 Croupier when cropped becomes sick as a chicken. (4)
- 24 Medic starting and finishing repair. (7)
- 26 A student leaves squalid supplier of giant axons. (5)
- 28 Receptor found in slice lying abandoned. (4)
- 30 Component of scatter diagram produced by matrix printer. (3)
- 32 Operate with reduced resources. (3)

**ALL WE WANT FOR CHRISTMAS IS A PhD**

*Who are the wild young things who wander into our departments for a few years, drink some beer, wear some questionable T shirts, then set off into the real world? Valerie Cox investigates.*

As some of you may know from the last issue, I have been appointed onto the Magazine Editorial Group as a young physiologist to try and generate more articles and items of interest to PhD students and postdocs. As Christmas approaches we all think of carol singing children with smiling faces and rosy cheeks. The nearest thing we've got to that here at the Medical School at Leeds is the PhD students, who can often be seen grinning inanely and with very flushed physiognomies, usually after several pints of Yorkshire's finest.

Working on the theory that I should get to know my target audience, I sent out a questionnaire to all the PhD students in Physiology and related departments here at Leeds University. The first thing I found was that they are an apathetic bunch who can't be bothered to fill in questionnaires. So to all of you who didn't bother to reply, I hope Santa fetches you nothing but coal this year. And a very big thank you to those of you who did take the time. Given that I had less than a 50% response rate, my data is more biased than a National Front meeting, but never mind. A bit of extrapolation, intrapolation and creative accountancy has worked wonders.

The obvious first question to ask was why they chose Physiology. Most had very positive reasons: interested in how the body functions, very interested in the project. A few had the more negative "hated plants". The majority had been setting up new methods as part of their PhD and this probably explains why some had no usable results for up to a year. A definite negative factor in morale (supervisors, please note).

Generally, the level of personal funding was not bad although it did vary markedly between individuals: anything from £6-10k per annum. All the postgrads supplement their income by demonstrating practicals or taking tutorial groups. In our lab this leads to a great deal of early morning panic as they desperately try to remember obscure, irrelevant physiological topics they haven't read since their own first year.

Most of the people who replied were planning to stay in university science either here or abroad (America/Canada/Australia). This did surprise me and I expect reflects the biased nature of my sampling rather than a genuine universal content with the university system. Those who were leaving either science or this country all stated lack of security and funding difficulties as the reason.

I asked many questions about the PhD supervisors. Overall those that responded were very happy and felt that their supervisors were available and interested in their project. However, some felt that they were not given enough help. Extra help came mostly from other PhD students and postdocs, with technicians and lecturers scoring very badly. The crunch question

was "How often do you feel like strangling your supervisor?". All the answers were nearer to never than to always. I am not able to comment on how much this surprised me as my ex-supervisor is very much alive and well and currently writing me a reference!

So finally to the main point of the questionnaire: how much did they know about The Physiological Society? Half were already Affiliates and knew it cost £5 a year (£10 with abstracts). Everyone knew that the Society organises scientific meetings, gives travel funds for their own and other meetings, funds summer student projects and produce a (superb) magazine. Nobody knew that they provided MSc funding and only half knew about the Benevolent Fund, the Eastern European & Third World funds and that funding was available for PhD students whose projects had been unavoidably delayed.

And what about Christmas? Generally, they are a home loving bunch, almost all planning to spend a cosy family Christmas with their parents. And what would they like from their supervisors for Christmas? Universally, their PhD written up. My own sympathies lie with the person who wanted a technician for their group. As for their all time dream present, all I can say is they lack imagination or ambition. No yachts or holiday homes in the Bahamas. Instead they aspire to have their debts paid off and a job. Oh and one of them wants an Audionote Okaru Amplifier. Whatever it is I hope that Santa has got room on his sleigh.



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**POSTDOCTORAL VACANCIES**

Two postdoctoral positions will be available in the British Heart Foundation Research Group, Dept of Physiology, School of Veterinary Sciences, Southwell Street, Bristol BS2 8EJ from 1 January 1995. The research, funded by a five year programme grant, will study the involvement of intracellular amino acids in the response of cardiac myocytes to insult. The project will study the mechanisms by which amino acids cross the cell membrane, how amino acids affect ion channels and protect against cellular damage. Experience with radioactive tracers measurements, patch clamp techniques, fluorescent photometry and flash photolysis would be an advantage. The laboratories are newly built and well equipped and are part of a highly successful and vigorous department.

Anyone interested should contact Reg Chapman at the above address or telephone either him on (0272) 288151 or Krai Chatamra on (0272) 288372.

## ANNUAL CONVENTIONS OR KEEPING SOCIETY TRADITIONS?

### 1994 Biophysical Society Meeting, New Orleans

The first meeting of the Biophysical Society I attended was in March of this year. Friends had told me that it was the best of the American societies for membrane physiology and I had joined in 1993. (Just in time to receive the journal free, as all Members of The Physiological Society did once upon a time, when it was a soothing pink.) The meeting started on Sunday 6 March and mostly took place in a huge convention centre on the bank of the Mississippi - a mile upstream from the historic, tourist-infested but undeniably attractive French Quarter. Since only about 4,000 people attended, the meeting did not occupy the whole convention centre. The rest at first housed a meeting of hairdressers and beauticians. They were easy to identify.



The core of the meeting was about 500 posters per day, which took up most of a huge exhibition hall. About half were fairly biological, the rest more concerning the physical properties of biological compounds. Posters were on display all day, but only personed at fixed times. Around this core activity there were four Special Events, and three Other Events (including a Women's Caucus Program) and twelve Symposia, six Workshops and five Subgroup Meetings, which mostly consisted of talks given in rooms full of uncomfortable ballroom-type chairs with a high platform for the speaker and the two chairpeople. Everyone had to use microphones. These made the proceedings rather formal and had the effect of making the posters much more interesting in contrast. Luckily it was easy to come and go without notice.

Comparing a typical Physiological Society Meeting with the Biophysical one, I missed being in a real university department, having talks in proper theatres, seeing live demonstrations and the freshness of presented results allowed by having many meetings a year. The deadline for abstracts was 1 November, 18 weeks in advance, as against about 11 weeks for the average one tenth the size Physiological Society Meeting. I also believe our voting procedure does make people try harder. Having only one large meeting meant there were many people I knew, but there was too little time for a substantial talk with most of them. And there were so many posters to read that I rapidly became saturated with new information.

I did attend the AGM, (or Business Meeting,) of the society, along with about 15 others. It was held at the same time as several other meetings, but not to discourage attendance from a membership apparently very happy with the way the Society is run. To be fair, those presenting their brief reports were surprised and even hurt when I complained about the poor attendance, which they told me was entirely normal. The balance sheet made an interesting contrast with that of The Physiological Society. Total assets were just over \$1.5 million, as against the Society's over £6 million. Members' subscriptions brought in about \$0.24 million, as against £0.11 million for the Society. We were also given a summary result of a membership survey. Automatic receipt of the *Biophysical Journal* was favoured by 63%. With age, enthusiasm for this diminished. The ranking of the *BJ* was also compared with its peer journals. *Science* came top at 78% of survey responses rating it highly important. *Nature* got 74%. Third on the list at 64% was ... the *Biophysical Journal*! The *Journal of General Physiology* was the only one listed with "Physiology" in the title and came 8th at 32%. *The Journal of Physiology* came nowhere. Perhaps it was not included in the question.

The great thing about having the meeting in New Orleans was that there were plenty of interesting places to eat and drink and walk around outside the meeting, and boats and trams to ride. But inside the convention centre you could have been anywhere. It was possible to tell that it was daylight outside, just. New Orleans is a very large, level city with a usually awful climate (while I was there it ranged from almost too hot to far too wet) and the usual high crime areas.



It was founded in 1718, according to the notice in the centre of the French Quarter. This famous tourist attraction is a large rectangular area of elegant houses, lively bars, inexpensive restaurants and expensive shops, which also has a large population of real people. Indeed, it is one of the few areas of any US city in which a sophisticated Eurotraveller can feel at home. Too many tourists intent on having a good time, though.

Unless you have resident friends, it is expensive to stay in New Orleans, although quite cheap to eat. The hotels offered by the housing bureau cost at least \$115 a night single, no breakfast. To attend the meeting even members of the society had to pay the registration fee of \$125, but it was \$50 extra for non-members.



There is only the one meeting a year. Is this where The Physiological Society will end up? Extrapolating from the current rate of decrease in the number of Meetings a year, we will be down to one in about five years' time.

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## HOW TO GET BY IN JAPAN

### Tokyo Women's Medical College International Meeting on "Ion Channels and Cellular Function of the Heart", July 1994

In July of this year I attended a meeting in Tokyo, Japan, entitled "Ion Channels and Cellular Function of the Heart". The meeting was organised by (amongst others) Aki Noma and Morimasa Yoshioka, as a memorial to Professor H Irisawa. The symposium participants, many of whom had worked with Professor Irisawa, were in nearly every case amongst the top in the world in their particular field. The talks were excellent and the discussions vigorous. Japanese interpreters were present to provide translational assistance which helped a great deal, although many of the Japanese researchers were more than competent at communicating in English.

During my trip to Japan, I also took the opportunity to visit the laboratory of Dr Atsuya Yoshida in Kyushu University, Fukuoka. Dr Yoshida introduced my colleague and me to his co-workers. Again, their English was excellent, mainly because every one of them had spent some time in Europe (mainly the UK and Germany) learning new techniques and, of course, learning English. With so many Asian journals now published in English, this is seen as essential. Japanese scientists work very long hours and more often than not have to combine research with another career as a clinician or as a dentist, for example.

Air fares to Japan tend to be rather expensive, but do vary greatly from airline to airline. For example, Virgin fly direct to Tokyo for under £800, whereas British Airways fly direct for around £1300 (economy class). The London-Tokyo flight takes around 12 hours in total. Anyone qualifying for an International Student Identity Card (*ie* if you are a full time student or are under 26 years of age) can get quite substantial reductions through STA and Trailfinders (*eg* the British Airways fare is reduced from £1300 to £960). If you are willing to stop over in Singapore or Hong Kong, fares can be even cheaper. As far as I am aware, no vaccinations are needed before travelling to Japan.

In July, temperatures are in the mid 40's and, as it is also the rainy season, cool, light clothes are recommended, plus a large umbrella! In March/April time, when The Physiological Society meeting is due to take place, the weather should be dry and temperate - very pleasant for sightseeing after the meeting.

Fig 1  
The word "physiology" written in Chinese characters. The calligraphy here was done by Kim Hyun-Seung. Thanks to Oxford University Press for permission to use this figure.

生理学

My impressions of life in Japan were without exception good. I would very much like to return. The people were extremely friendly. If you are seen to be lost or puzzled, you are quickly rescued by the nearest English-speaking Japanese person. Travelling around on public transport is no problem, services are efficient, if a little more expensive than in the UK. Rail tickets can be purchased in advance in the UK via the Japanese Tourist Board in London. If you are planning to travel around Japan, it can be cheaper to purchase a rail travel pass which allows unlimited travel for a set period of time. There are many English signs in the main tourist destinations; however, I would recommend taking a book such as Berlitz's *Japanese for Travellers*, which I found very useful for translating restaurant menus and for purchasing tickets *etc*. One of the main things I particularly like about Japan over any other country is the admirably low crime rate. This makes for a much more relaxed time and is a massive bonus for lone travellers.

On the two occasions I have visited Japan to attend conferences, the meetings have been extremely well organised. Accommodation was offered in various hotels at a variety of prices. Hotel accommodation for the meeting in Tokyo tended to be over £80, but for meetings outside the capital, accommodation can be obtained for upwards of £40. Hotel rooms tend to be very compact, with everything you'd expect in a typical hotel room, packed into a room maybe a third of the size! At the meetings I attended, social activities were also organised. In Kobe, the first meeting that I attended, events were planned for every night. However, if this is not the case, eating out is not too expensive as long as one avoids Western style restaurants. We ate at Japanese bar/restaurants and soon discovered what we did and didn't like. As well as sushi, I would recommend tempura, which is sliced vegetables fried in a very light batter. It is delicious and costs around £6 or £7 for a main course.

I would greatly encourage young physiologists to attend the Joint Meeting with the Japanese Physiological Society, which is to be held in Japan this Spring. As part of the closing ceremony of the Tokyo conference, I attended a speech which was given by Professor Denis Noble, about progress in physiology. He also told us that the Japanese word for "physiology" was composed of three characters (based on Chinese characters), which are life, logic and study (see Fig 1, taken from Noble & Boyd, 1993), thus together translating to the "study of the logic of life". This struck me as a particularly elegant way to define physiology.

Sian Rees



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**Society for Endocrinology  
15th MEETING  
23-25 November 1994  
London**

Further details from: Janet Crompton, Society for Endocrinology, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS12 4NQ, tel (0454) 619036, fax (0454) 616071. ★★

**Society for Endocrinology  
POSTGRADUATE TRAINING COURSE  
IN ENDOCRINOLOGY  
23-25 November 1994  
Cardiff**

Further details from: Janet Crompton, Society for Endocrinology, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS12 4NQ, tel (0454) 619036, fax (0454) 616071. ★★

**British Society for Cardiovascular  
Research  
Winter Meeting  
DRUGS FOR THE HEART  
8-9 December 1994**

**Bristol Royal Infirmary, Bristol**  
Further details from: Dr S J Coker, Dept of Pharmacology & Therapeutics, University of Liverpool, PO Box 147, Liverpool L69 3BX, tel (051) 794 5550, fax (051) 794 5540. ★★

**15th ALTERNATIVE MUSCLE CLUB  
18-21 December 1994  
University of Leeds**

A chance for PhD students and postdocs in the field of muscle biology to present their work in a relatively informal atmosphere. Sessions on topics as diverse as genetic point mutations and whole muscle mechanics and possibly cardiac muscle and sports science. Guest speaker: Sir Andrew Huxley. Special registration rates for Affiliates of The Physiological Society. Further details from: Dr Valerie Cox/Dr Nicola Osbaldeston, Muscle Research, Level 11, Worsley Building, University of Leeds, Leeds LS2 9JT, tel (0532) 335893, fax (0532) 334803. ★★

**Brain Research Association  
UNDERSTANDING MEMORY  
DYSFUNCTION  
9 February 1995  
University of Leicester**

A workshop on current models of memory and approaches to studying memory dysfunction. Speakers: A Baddeley (Cambridge), A Mayes (Sheffield), R Morris (Institute of Psychiatry), J Aggleton (Durham), S Iversen (Oxford), G Wilcox (Bristol), C Frith (UCL). Further details from: Dr Jon Scott, Dept of Cell Physiology & Pharmacology, University of Leicester, PO Box 138, Leicester LE1 9HN, tel (0116) 252 3083, fax (0116) 252 5045, Email js50@le.ac.uk ★

**NEUROLOGY FOR  
NEUROSCIENTISTS  
27-28 March 1995**

**Magdalen College, Oxford**  
A symposium to demonstrate how clinical neurology can illuminate neural function and help neuroscientists. Sponsored by the Guarantors of Brain, everything is covered, even some graduate students' travel expenses, for a nominal registration of £20. For further details, send a short CV (in the event of oversubscription) to: Prof J B Clark, Neurochemistry, National Hospital, Queen Square, London WC1N 3BG, tel (071) 829 8722 ★★

**SEROTONIN AND THE CONTROL OF  
EMESIS: A Decade of Progress  
27-29 March 1995  
Oxford**

Further details from: Alexandra Carrington, Oxford Clinical Communications, 213 Barns Road, Oxford OX4 3UT, tel (01865) 747774, fax (01865) 772147, Internet address 6233532@mcimail.com ★

**International Meeting  
LIPOSOME BIRTHDAY CONFERENCE  
27-30 March 1995**

**The Babraham Institute & St Catharine's College, Cambridge**  
Main speakers include: A Bangham (Babraham), D Papahadjopoulos (San Francisco), V Skulachev (Moscow), R Pagano (Baltimore), L Leserman (Marseille), C Alving (Washington), G Lopez-Berestein (Houston), L Huang (Pittsburgh). Poster space is available and workshops will be held on membrane topology, gene therapy, product developments, drug delivery, clinical dimension and skin care. Deadline for registration: 30 December 1994. Further detail from: Zeller MacDougall, The Babraham Institute, Babraham, Cambridge CB2 4AT, tel (0223) 832312, fax (0223) 833676. ★★

**British & European Federation of  
Endocrine Societies  
14th JOINT MEETING  
27-30 March 1995  
Warwick**

Programme Organising Committee  
Chairman: Prof J A H Wass. Symposia to include: nuclear receptors, the calcium receptor, role of growth factors in mammary growth, global fertility control, neuroendocrine control by excitatory amino acids and nitrous oxide, the endocrinology of the desperately ill, intracellular signalling of metabolic peptides. Clinical management workshops to include: thyroid cancer, Turner's syndrome, hyponatraemia and diabetes insipidus. There will also be methods updates sessions and a molecular endocrinology workshop. Deadline for receipt of abstracts: 9 December 1994. Further details from: Janet Crompton, British Endocrine Societies, 17/18 The Courtyard, Woodlands, Almondsbury, Bristol BS14 4NQ, tel (0454) 619036, fax (0454) 616071. ★★

**Royal Microscopical Society  
CYTO 95  
3-6 July 1995**

**University of Southampton**  
A new series of bi-annual international scientific meetings to take a fresh and critical look at areas of the life sciences currently under intense research. Further details from: The Royal Microscopical Society, 37/38 St Clements, Oxford OX4 1AJ, tel (01865) 248768, fax (01865) 781237 ★

**International Union of Biological  
Sciences  
4th International Congress of  
COMPARATIVE PHYSIOLOGY AND  
BIOCHEMISTRY  
6-11 August 1995  
Birmingham**

Further details from: Moira Wilson, Universal Conference Consultants, China Court Business Centre, Ladywell Walk, Birmingham B5 4RX, tel (021) 622 3644, fax (021) 622 2333 ★★

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2nd International Congress  
13-16 September 1995  
Cracow, Poland**

Basic topics: neuroactive amino acids, neuropeptides, myelogenesis, brain & spinal cord plasticity, brain injury, neuroimaging, melatonin, memory & learning. Further details from: Dr K Ossowska, Institute of Pharmacology, Polish Academy of Sciences, 12 Smetna St, 31-343 Krakow, Poland, tel (00 48) 12 37 40 22, fax (00 48) 12 37 45 00 ★

**One of the Remotest B+B's in Britain**  
Members may be interested to know that Dr Peter Kohn, recently retired from the Sheffield Dept of Biomedical Science, will now be offering Bed & Breakfast in the Highlands at what his predecessors described as "the remotest B&B in Britain" at Kerrachar, Kylesku-by-Lairg, Sutherland IV27 4HW, tel (01571) 833 288 ★

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**Visiting Scientists**

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

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## PATON PRIZE BURSARIES IN HISTORY OF PHYSIOLOGY

The late Sir William Paton donated funds to The Physiological Society for the encouragement of scholarship and interest in the history of Physiology. These have been matched by the Society and the Historical Studies & Archives Sub-Committee, which has as part of its objectives the fostering of both an interest in and the study of the historical perspective which underlies our present day understanding of physiology, and wishes to provide a positive way of expressing this.

The Sub-Committee is offering **Paton Prize Bursaries in the History of Physiology** (£1,000 each), to be awarded on a competitive basis, for studies on the historical development of the major ideas which have shaped modern Physiology, *ie* over the late 19th and 20th centuries. The Prize Bursaries, which may be used for any purposes, will be awarded for a project which will be undertaken for one year, after which there will be a formal presentation to the Society and the award of an inscribed parchment.

Applicants will be free to choose their own area of study but the Sub-Committee is happy to offer preliminary advice on the suitability of topics, on request. In making the awards the Sub-Committee will have in mind the idea, expressed by Sir William, that it was important to foster studies which emphasise the historical development of concepts important to physiology at the expense of those based on the individual and personal anecdote.

The final article (approx 20,000 words) must be written up in a suitable format with a full bibliography and be sent to the Sub-Committee within one year of the award. It is intended that it will also form the basis of a lecture or similar presentation to the Society at a symposium or Special Interest Group Session at which the Commemorative Parchment and prize money will be presented. The article itself will be published in one of the Society's publications, subject to the usual editorial processes.

Entries are invited from individuals in any discipline and the Subcommittee would particularly like to encourage entries from young scientists, including postdoctoral staff and postgraduate students, for whom a special prize may be available.

In assessing entries, the Sub-Committee will place a strong emphasis on the importance of the overall contribution of the topic to the history of physiology and to the approach adopted.

### Applications

These should take the form of a **Summary (500-600 words) of the intended subject**, together with a short statement which highlights the historical relevance and interest. Entries will be assessed by the Sub-Committee and the successful applicants should be informed in March 1995. The final project material must be submitted within one year of acceptance to qualify for the prize.

Entries should be sent to: Professor Cecil Kidd, Chairman, Physiological Society Historical Sub-Committee, Dept of Biomedical Sciences, Marischal College, University of Aberdeen, Aberdeen AB9 1AS, UK by the closing date, tel (01224) 273006, fax (01224) 273019.

Closing Date: 31 January 1995

## MSc BURSARIES

The Society has allocated a sum of £10,000 for the support of graduates who wish to enrol in MSc courses in Physiology (including Human and Applied Physiology, Neurophysiology etc), or graduates in Physiology wishing to take courses relevant to the development of their careers in physiological sciences, and who are unable to obtain any LEA support for fees, subsistence etc. No grant will exceed £2,000 and this support should be viewed as "seed funding".

### Eligibility

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

### Awards

The maximum allowable will be £2,000 and not more than a single award can be made to an individual.

### Applications

Applications can be made twice a year (deadlines 31 May and 30 November) and applicants must provide a completed application form via The Physiological Society's Administration Office, together with a letter of recommendation from the Head of the department in which they graduated, and a letter of acceptance from the course director or Head of the department in which they seek to study. The application will contain a question relating to the candidate's career objectives.

### Evaluation

Where more than one candidate is an applicant for the same course, the course organiser will also be asked to rank those applicants, although that information will count only as a reference point and will not be binding on the committee.

Application forms are available from The Physiological Society (Bursaries), PO Box 506, OXFORD OX1 3XE, tel (01865) 798498, fax (01865) 798092.

TITLE	PURPOSE	ELIGIBILITY	AWARDS	APPLICATIONS
<b>AFFILIATE TRAVEL GRANT SCHEME</b>	To enable Affiliates to attend meetings and symposia overseas	Affiliates in the British Isles who have not already received a grant under this scheme (Eligibility continues for a year after election to Membership of the Society)	Up to £600	Applications are considered at the end of January, March, May, July, September and November
<b>BENEVOLENT FUND</b>	To assist persons who have contributed to the advancement of Physiology and are in necessitous circumstances	Physiologists, their staff and dependants	Depend on circumstances	Applications are reviewed immediately on receipt
<b>BURSARIES</b>	To support graduates undertaking MSc courses in physiological disciplines who cannot obtain funds from other sources	Science graduates of institutions in the British Isles	Up to £2,000	Applications are considered at the end of May and November
<b>DALE FUND</b>	To promote new physiological research in the British Isles	Physiologists working in the British Isles	Travel for collaborative research, learning new techniques, practical workshops and training courses: up to £800. Travel to conferences and symposia: up to £300	Applications are considered throughout the year
<b>EASTERN EUROPEAN AND THIRD WORLD SUPPORT SCHEME</b>	To support centres of scientific excellence where high quality physiological research is threatened by lack of resources	Centres of physiological research in Eastern European and Third World countries demonstrating scientific excellence and financial need	Up to £10,000 per annum, for up to three years	Applications are considered at the end of January, March, May, July, September and November
<b>EASTERN EUROPEAN AND THIRD WORLD VISITOR FUND</b>	To allow physiological workers in Eastern European and Third World countries to visit laboratories in the British Isles	Physiologists in Eastern European and Third World countries seeking to undertake collaborative research in the British Isles	Up to £1,500	Applications must be made by the host in the British Isles, and are considered at the end of January, March, May, July, September and November
<b>NEW LECTURERS SUPPORT FUND</b>	To help young physiologists to establish independent research programmes	Academic staff in the first year of their first appointment to an established University lectureship in the UK or Eire	Up to £5,000 for consumables, equipment and, in exceptional cases, technical help	Applications are considered at the end of March and September
<b>POSTGRADUATE SUPPORT FUND</b>	To assist the completion of research projects which have been delayed due to circumstances outside the applicant's control	Graduates (normally PhD students) in departments of Physiology or a cognate science in the British Isles, whose supervisors are Members of the Society	Up to £1,000	Applications should normally be submitted before 31 July, but may be considered at other times
<b>RUSHTON FUND</b>	To promote new physiological research in the British Isles	Young physiologists working in the British Isles who are not yet Members of the Society	Travel grants for collaborative research, learning new techniques, practical workshops and training courses: up to £500.	Applications are considered throughout the year
<b>VACATION STUDENTSHIPS</b>	To enable undergraduates to undertake research projects in the summer vacation	Undergraduates in the UK and Eire in their second year or above, for work in the laboratory of a Member of the Society	Up to £500, for maintenance (no support available for consumables or other research expenses)	Applications must be submitted by 31 March

## PUBLICATIONS OF THE PHYSIOLOGICAL SOCIETY

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

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No 36: *The Electrophysiology of Gland Cells* (1980) Petersen

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No 42: *Memoir on the Pancreas* (1985) Bernard & Henderson

Nos 36-42 are published by Academic Press, Foots Cray, High Street, Sidcup, Kent DA14 5HP

No 43: *Human Baroreflexes in Health and Disease* (1992) Eckberg & Sleight. Price: £65 [Price to Members: £48.75, using order form in issue No 11 of the Magazine]. Hardback, 588 pp. ISBN 0-19-857693-5

No 44: *Intramembrane Charge Movements in Striated Muscle* (1993) Huang. Price: £45 [Price to Members: £33.75, using order form in issue No 11 of the Magazine]. Hardback, 302pp. ISBN 0-19-857749-4

No 45: *Cortical Function and Voluntary Movement* (1993) Porter & Lemon. Price: £60/\$95. Hardback, 440 pp ISBN 0-19-857745-1

Nos 43-45 are available from: CWO Dept, Oxford University Press, Saxon Way West, Corby, Northants NN18 9ES, tel (0536) 746337, fax (0536) 744964.

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#### Physiological Society Study Guides

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

### Studies in Physiology

*Pathophysiology of the Gut and Airways: an Introduction* (1993) ed P L R Andrews & J G Widdicombe. Price: £16.95/\$27.50 [Price to Members: £12.70/\$20.60]. Paperback, 130 pp. Available from: Portland Press, Commerce Way, Colchester CO2 8HP or (North America) Portland Press Inc, Ashgate Publishing Co, Old Post Road, Brookfield, VT 05036-9704, USA. ISBN 1-85578-022-4

### Books

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*The History of the Physiological Society during its First Fifty Years, 1876-1926* (1927) Sir Edward Sharpey-Schafer. Facsimile edition (1993) available from: The Physiological Society, Administration & Publications Office, PO Box 506, Oxford OX1 3XE, tel (0865) 798498, fax (0865) 798092. ISBN 0-9509659-3-6

### Careers Information

*Cell to Man - Physiology: Education and Career* (1993) Booklet for school children, teachers and careers services, with three accompanying posters. Free to residents of UK/Eire. ISBN 0-9509659-2-8

*Physiology: An Inside View* Video available to residents of UK/Eire on loan free of charge.

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

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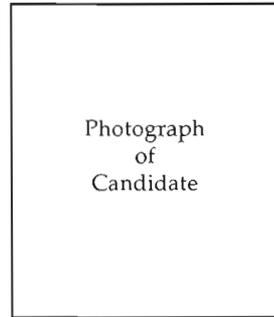
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I confirm that the information given above is accurate and up to date and that I hereby authorise The Physiological Society to hold this, and such other personal information as is supplied to the Society by me or my authorised agents or representatives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

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

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

I hereby confirm that the Candidate:

- (a) is either a postdoctoral worker or registered for a higher degree in Physiology or a cognate subject, and
- (b) is a person suitable for admission to Society Meetings.

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

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

Address .....

.....

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

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

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

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

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

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

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

### Field of Interest:

01 Anaesthesia	16 General Physiology
02 Anatomy & Embryology	17 Immunology
03 Biochemistry	18 Liver & Bile
04 Biophysics	19 Lipids & Steroids
05 Biomedical Engineering	20 Microbiology
06 Blood	21 Minerals, Bone & Teeth
07 Cardiovascular	33 Molecular Physiology
08 Cellular & Tissue	22 Muscle & Exercise
09 Comparative Physiology	23 Neuroscience
10 Electrolyte & Water Balance	24 Nutrition & Food
11 Endocrines	25 Pathology
12 Energy Metabolism & Temperature Regulation	26 Pharmacology
13 Environmental	27 Radiation
14 Enzymes	28 Renal
15 Gastrointestinal	29 Reproduction
	30 Respiration

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

### Special Interest Groups Current Codes

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

# The Aberdeen Meeting



*The Civic Reception*



*Essential drinks at every Meeting*

*John Severinghaus and Counsellor Savidge*



*Alan North (right) after delivering the Hans Kosterlitz Lecture, in conversation with Sir Hans*

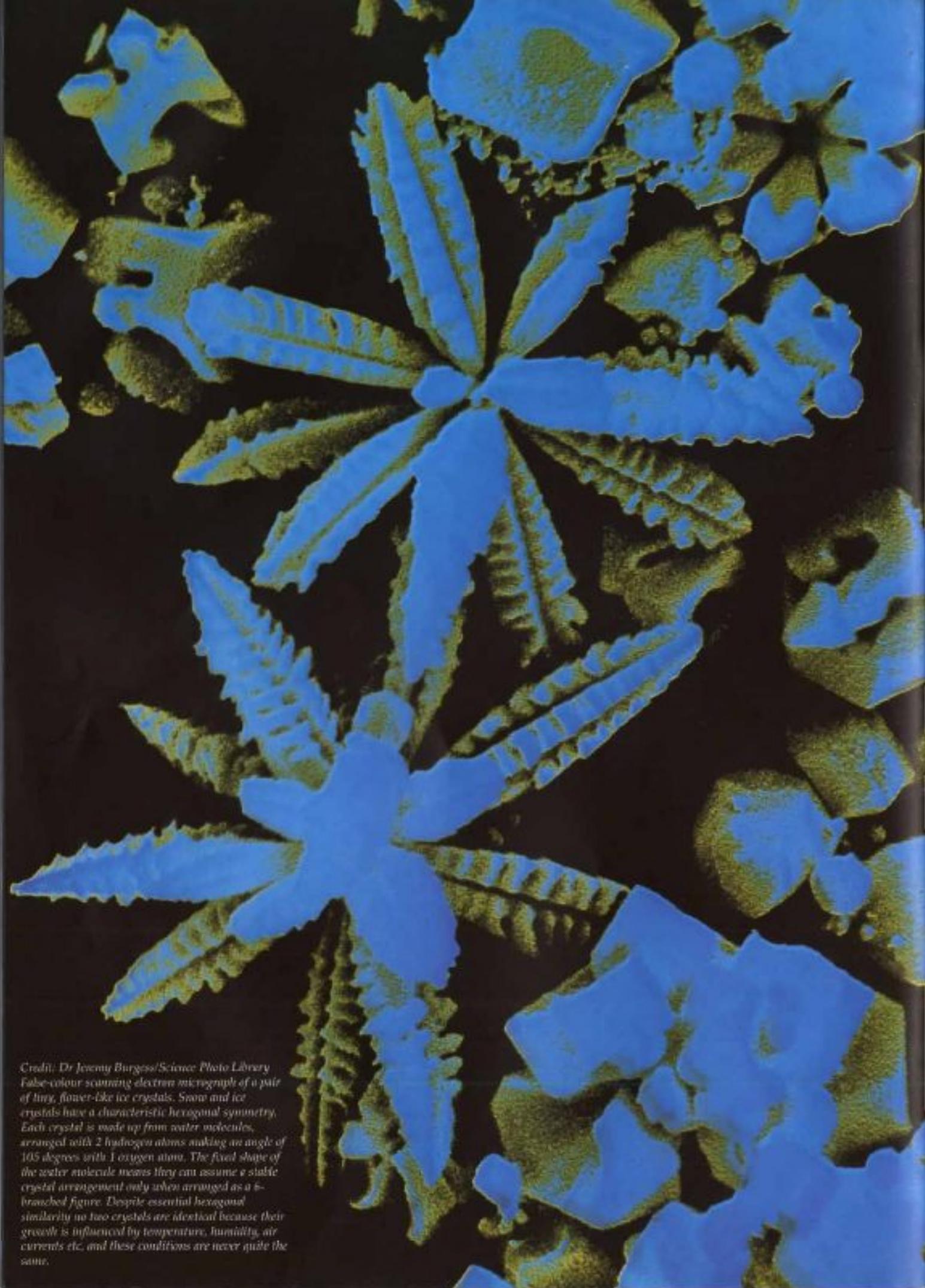


*Step we gaily, on we go*

*Photography by John MacIntosh*

*The Society Dinner*





*Credit: Dr Jeremy Burgess/Science Photo Library*  
False-colour scanning electron micrograph of a pair of tiny, flower-like ice crystals. Snow and ice crystals have a characteristic hexagonal symmetry. Each crystal is made up from water molecules, arranged with 2 hydrogen atoms making an angle of 105 degrees with 1 oxygen atom. The fixed shape of the water molecule means they can assume a stable crystal arrangement only when arranged as a 6-branched figure. Despite essential hexagonal similarity no two crystals are identical because their growth is influenced by temperature, humidity, air currents etc, and these conditions are never quite the same.