Quarterly SGM

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AUGUST 1998

- House of Lords Inquiry into antibiotic resistance
- Medical research charities
- Alternatives to work placements
- The 'Petri' dish?
- SGM journals to go on-line

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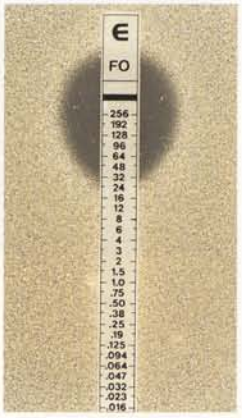

Front cover: The Houses of Parliament, London.
Courtesy of Travel Ink Photo & Feature Library, Goring-on-Thames, Oxfordshire.

Left: Measurement of antimicrobial activity by E test and disc diffusion methods.
Courtesy of Dr D.F.G. Brown, Public Health and Clinical Microbiology Laboratory, Cambridge.

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REMEMBER! Always quote your Membership number in any correspondence.

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EDITORIAL

Attendance at Society Main Symposia

Call it pique, I suppose. And it's well known that one of two tell-tale signs of a scientist being over the hill is that they ruminate on how things were so much better in past times (the other being an interest in the history or philosophy of science). No jeremiad intended, as you'll see; but I was a bit saddened at the low attendance for the Main Symposium *Microbial Responses to Light and Time* at this year's Spring meeting at Nottingham. Well, I would be, wouldn't I, being one of the organizers. Mind you, it wasn't an embarrassingly low turn-out; easy enough to explain away to our European and American speakers. There's no doubt also that the competition, in terms of other things going on at the same time, was pretty strong – the meeting was altogether an excellent one, as everyone who attended will attest.

Is it just rosy-tinted vision looking backwards two or three decades, to recollect much stronger attendance at Main Symposia, when many of the audience attended to enhance their general knowledge of microbiology? Things were more relaxed then, one says to oneself. Now there's more that one needs to know in one's specialist area, fiercer competition for diminishing research funding. There isn't the time to indulge oneself in acquiring general knowledge, however much one would like to do so. On any particular occasion there are more pressing alternatives, so each time one leaves aside the general for the focused. And there are other factors. For everyone, time is short; funds to attend meetings are hard to obtain, or have to compete with essential research expenditure. Naturally, the temptation is to make sure attendance is maximally justifiable.

The crunch question: if I hadn't been one of the organizers, would I have attended *Microbial Responses to Light and Time* myself? And as much to the point, would I then have encouraged my younger research colleagues to do so?

The pressures are a reality, of course, but I think there's an attitude that goes beyond them. Time was that many academics and other researchers would loftily declare their remit to be the pursuit of knowledge for its own sake. As always in human affairs, for many this was no more than they sincerely believed, for others an unthinking response, for yet others an excuse for inertia, a wish to avoid the stress of commercial or applied practicalities. In more recent years, avowed aims have altered to achieve, mostly, an acceptable and shifting balance between fundamental research and the demands of the 'real world'. But it is natural to over-react. Perhaps even among those whose research is at a basic level, there is a feeling that seriousness of purpose demands concentration or focus; that to make time for areas outside one's immediate concerns is an indulgence – a kind of intellectual chocoholism – that has to be firmly held to a low priority.

And if established scientists have come to think this way, how much more understandable is such an attitude in younger scientists who still have their way to make, caught in a ludicrously unfair system where dedication in the shape of unsocial (one is tempted to add, un-family and un-life) hours is rewarded by a virtually illegal institutionalized insecurity?

But the trouble with this new Puritanism is that it is in the end counter-productive.

I could play the obvious you-might-need-it-for-teaching card, but that is self-evident for those of us in teaching jobs. The general point is the important one here. In the end, we all depend on new ideas and these most often need an element of mental free-wheeling. Commitment of one's attention to unfamiliar material can set off all sorts of new trains of thought, unexpected associations, threads of logical inference, methodologically inventive ideas, recognition of the relevance of bench techniques or computer packages, endless 'what-if?'s. And for younger workers, there's additionally a stark career aspect: you may well not want, nor be able, to continue indefinitely what you're doing now; best suss out in good time where the action might be in a few years.

Will I practise what I preach? No more than most, I expect. It's hard to get oneself to do things whose necessity is both long-term and stochastic. Perhaps we could all resolve to devote a bit of every meeting to listening to the unfamiliar. And finally, at least those who missed *Microbial Responses to Light and Time* have the option of reading – or even (commercial break!) buying – the symposium book.* Great fun, I can tell you.

Simon Baumberg, University of Leeds

**An order form for members was enclosed with the May Quarterly.*

In this issue ...

The resistance of pathogens to anti-microbial agents is a matter of concern to both the public and the scientific community. SGM input to the recent House of Lords Select Committee Inquiry is covered on pp. 94–95. Yet despite government interest in such medical problems, Diana Garnham shows that the funding for research is quite likely to come from medical charities these days (pp. 92–93).

The culturing of micro-organisms is a core activity of our discipline. The difficulties of maintaining microbial collections in Belarus since the break up of the Soviet Union are described on p. 107, whilst on pp. 98–99 Milton Wainwright does some detective work on the origins of the 'Petri' dish.

Moving out of the lab, students in Manchester find some interesting alternatives to work placements (pp. 96–97) and the general public in Edinburgh learn about the rôle of micro-organisms in the production of common items in their diet (pp. 100–101).

These articles appear in addition to all the regular features and reports of Society activities.

Please note that views expressed in this Comment do not necessarily reflect official policy of the SGM Council.

Medical Research Charities in the UK – A Long History and a Growing Rôle

Many medical research charities have their roots in past centuries, yet their contribution to current research funding is enormous.

Diana Garnham

Providing care for the sick and dying is one of the most fundamental of society's philanthropic acts – the Good Samaritan poured oil into the wounds of the man he found beaten and robbed – so it is not surprising that charities have played, and continue to play, a key rôle within the UK's health services. Until the Dissolution of the Monasteries in the 16th century, the Church led in providing respite for the sick and the dying, both poor and wealthy. The Church had also taken the lead in establishing institutions that developed knowledge and teaching, many of which grew to become our famous public schools and universities. After the Dissolution the freedom to establish charitable associations was taken up by groups of individuals and small local hospitals grew up throughout Britain. In time, individuals associated with the charitable hospitals understood that improving the health of people was a complex issue which required efficiency and sophistication.The charitable foundations began to widen their rôle from the care of the sick to the development of medical training and education, later moving to underpin the search for greater knowledge and understanding of human disease. Some of the small charitable hospitals became large and internationally renowned centres, for example St Thomas' and Guy's hospitals in London; others were absorbed into the National Health Service (NHS) and sadly, many have now completely disappeared.

The 20th century has heralded the most significant and rapid change in medicine and in public attitudes to voluntary action. The public and charities have responded to become a major force in funding medical research in the UK, now that in the main the publicly funded NHS provides care and comfort for the sick and dying. Almost all the specifically research-focused medical charities have been established since the founding of the NHS in 1948, with the greatest period of growth coming in the last 30 years. Some charities are older, but their original remit to care for the sick has been extended more recently to include the funding of relevant research activities. Such charities include those for the blind (Guide Dogs for the Blind Association began to support research in 1990) and the Special Trusteeships of the London Teaching Hospitals. Now it is accepted that one of the most effective ways that charities can help the sick, the dying and the frail is to fund research which will further our understanding of human disease and work towards its prevention, improved treatment and perhaps a cure.

Charities are one of the few effective vehicles through which the public is able to influence the medical research agenda. Charities can, and do, bring together a range of different stakeholders with a common interest in a particular disease or condition: patients, their families, NHS managers and planners, scientists and other medical and non-medical professionals. Such a broadly based, yet focused, committed and energetic network of interested individuals is sometimes difficult to obtain for the more general research funding bodies and for government-led institutions.

The charity sector in UK medical research is extraordinarily broadly based with charities covering almost every human condition and disease. Even if the condition is very rare, affecting just tens of people, there are special networks and family self-help groups which help to inform and support patients undergoing treatment or in their search for information about their condition. However, cancer continues to dominate the public response to medical research and accounts for nearly 30% of charity support for research in the UK (Fig. 1). This concentration on one disease area is in some way balanced by the Wellcome Trust, which has a very general remit to fund biomedical research, and a number of other, smaller medical research charities, for example, the Sir Jules Thorn Charitable Trust, Research into Ageing, Action Research, Children Nationwide, the Wessex Medical Trust and the Beit Memorial Fellowships.

One of the oldest groups of charitable funders of medical research within the UK is the chest, heart and stroke charities which began life 100 years ago as the National Association for the Prevention of Tuberculosis, founded by the then Queen's physician, Sir William Broadbent and a small group of professional colleagues. The association has gone through an amazing evolution, becoming the Chest Heart and Stroke Association and eventually dividing into separate organizations for Scotland, Northern Ireland, and England and Wales. But the changes do not end at that point as, in response to growing specialization within the professions and the emergence of greater scientific opportunity, the British Heart Foundation took on the mantle of heart disease in 1961 and the British Lung Foundation was established in 1985. The Chest, Heart and Stroke Association in England now focuses on stroke, changing its name once again to the Stroke Association. Another charity which has evolved in response to changes in the pattern of disease, patient interest and scientific opportunity is Action Research which was originally founded in 1952 as the National Fund for Poliomyelitis.

As advances in medical knowledge and training increased, groups of professionals began to come together to establish organizations which focused research and training support in narrower fields of science. There are an enormous number

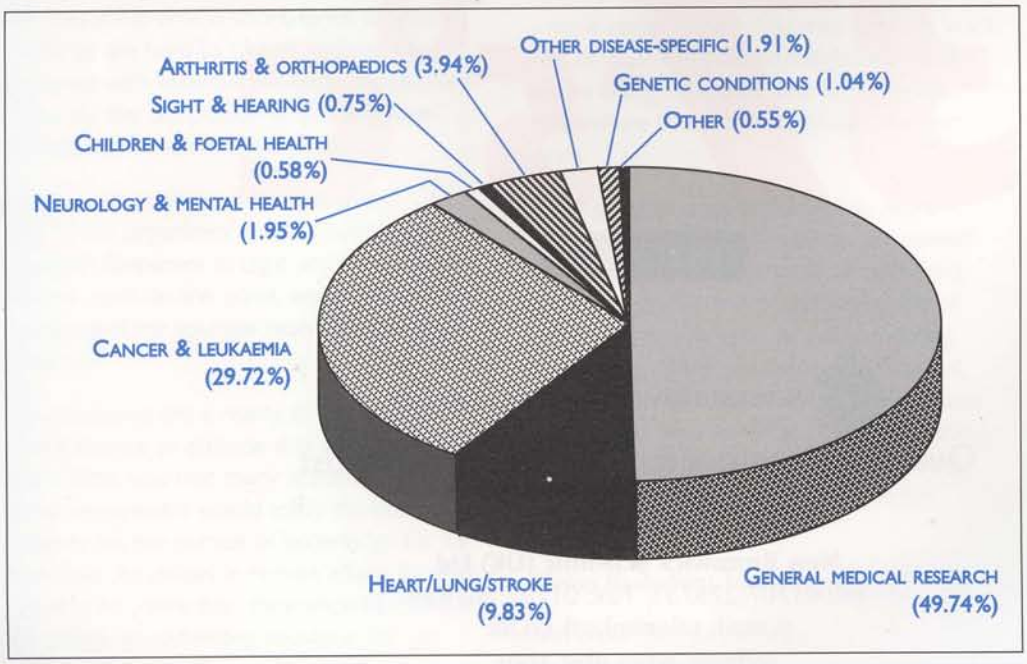

Fig. 1. Expenditure of AMRC member charities by charity purpose (1996/97).

of these 'profession' led charities in the UK, all working closely with the NHS and with universities. Examples include the British Digestive Foundation (1971), the Arthritis Research Campaign (formerly the Arthritis and Rheumatism Council, founded in 1936), the British Brain and Spine Foundation (1992) and WellBeing, the charitable arm of the Royal College of Gynaecologists.

Another way in which charities have been established, particularly in single disease areas, is when specialist clinicians come together with groups of patients or their families, very often in association with specialist hospitals or training facilities. For example, the modest gift of £20,000 from a grateful patient to his clinician began a professional and patient partnership which emerged in 1929 to be the Cancer Research Campaign. The Imperial Cancer Research Fund was very much profession led when in 1902 the Royal Colleges of Surgeons and Physicians launched a public appeal in *The Times* to raise funds to establish a specialist research facility at Lincoln's Inn. Later, as the differences in the nature of leukaemia became apparent and more understood, both patients and professionals responded to the opportunities for research by coming together to establish the Leukaemia Research Fund.

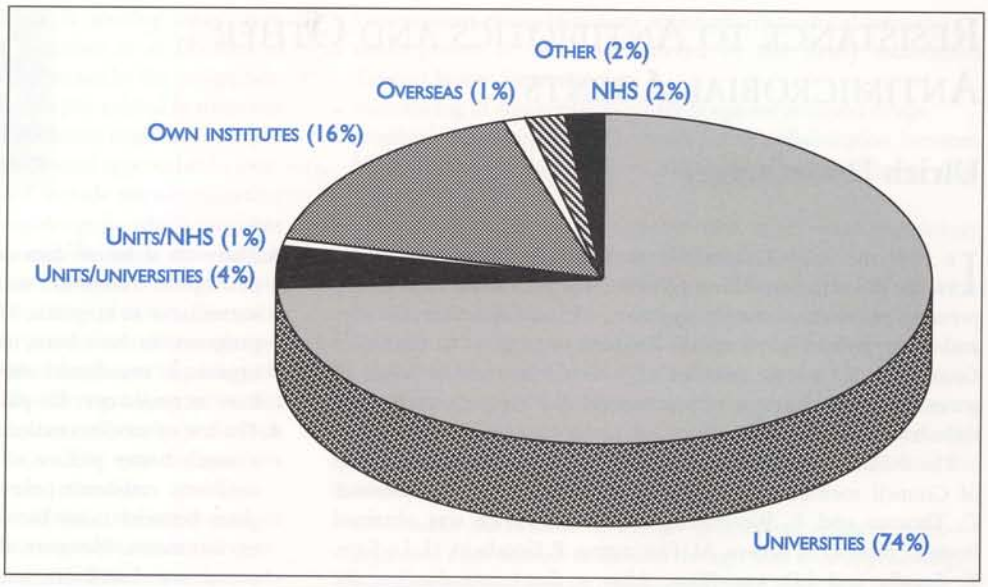

Fig. 2. Expenditure of AMRC member charities by research institute type (1995).

However, the most common impetus for the establishment of a medical research charity is the interest of patients and their families. One of the oldest patient organizations is the British Diabetic Association which was founded in 1934 by H.G. Wells and Dr R.D. Lawrence – it is probably the first self help organization in the UK which brought together medical and lay people.

A characteristic of many of the older medical research charities is that they are relatively general in their area of interest, looking at a disease system, organ or a clinical speciality rather than a single disease. For example, the older cancer charities deal with a whole range of cancers, whereas the more recently established charities tend to focus on a particular cancer, for example breast cancer, lung cancer and ovarian cancer. Since 1979 there has been an enormous expansion in the numbers of single disease charities, reflecting both the growing interests and active contribution of patients and the scientific opportunities which are emerging. Between 1959 and 1979 there were 340 new registrations with the Charity Commission for organizations which promote medical knowledge and/or research. Yet between 1979 and 1993 there were 1267 new registrations with 290 in the cancer field alone. This growth is driven, at least in part, by scientific opportunity and is perhaps most apparent in recent years in the areas of genetics and neurosciences where, even in comparison to 10–15 years ago, there would have been little opportunity for small charities to make an impact on research.

Most of the major charities are members of the Association of Medical Research Charities (AMRC) which was founded in 1987 in response to the growing rôle of the charities and the need for them to have a voice in UK medical science planning. The existence of AMRC is also, in part, a recognition by the sector that it can, and should, play an enhanced rôle in shaping medical research through increased collaboration.

There are now 100 charities within AMRC and their combined expenditure on UK medical research amounted to £420m in 1996/97, considerably more than the £320m available to the Medical Research Council. Almost half of this total (£196m) is represented by the Wellcome Trust, the world's largest charity. Within AMRC there are just five other charities, in addition to the Wellcome Trust, which spend more than £10m per annum: Imperial Cancer Research Fund (£53m), Cancer Research Campaign (£43m), British Heart Foundation (£34m), Arthritis Research Campaign (£15m) and the Leukaemia Research Fund (£10m). Even though these five charities have relatively broadly based interest within their field, it is a key characteristic of medical research charities in general that they focus their activities in a way that government funded agencies, such as the Medical Research Council, do not. Medical research charities are also mainly very small, the majority spending less than £100,000 per annum on research in the UK, which limits their potential to fund large-scale research initiatives unless working in partnership with larger charities or government-funded institutions. Even so, many charities are the principal or only source of funding for research into their disease area and are able to make a significant contribution to the understanding of the condition and in developing professional expertise in the care and treatment of patients. This is particularly true of the small genetic conditions where a few researchers funded by a charity are able to capitalize on more fundamental medical research which may be funded from other sources. Medical research charities, once established, tend to maintain their focus and stay loyal to an aim which is not affected by fashion and political urgency. They therefore offer some stability, albeit often on a small scale, for scientists with interests in less common conditions.

The charitable sector in the UK is unique in the world for the major rôle it now plays in the support of UK medical science. UK charities fund approximately one-third of this country's medical research and they are the major external source of funding for research in universities. There are a wide range of different types of charity in the sector funding many different types of research through a wide variety of schemes. Charities fund projects, buildings, ongoing programmes of work, the development of specialist units, professorships, fellowships, PhD students, equipment and many other research activities (Fig. 2). For example, AMRC members fund over 1000 projects per annum and support almost 500 clinical professionals, mainly working in the NHS. Although a few medical research charities support their own research institutes (for example, the Imperial Cancer Research Fund), the majority of charity support for medical research funds researchers in UK universities and in the NHS.

Given that health care in the UK is now delivered by a tax-funded public health system it is not surprising that the charity sector involvement has changed. Responding to a reduced need for them to deliver health care, charities have taken up and contributed to the undoubted strengths of the UK medical science by becoming a major force as research funding partners.

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Resistance to Antibiotics and Other Antimicrobial Agents

Ulrich Desselberger

The increasing resistance of pathogens to antibiotics and other antimicrobials is a matter of great importance. Ulrich Desselberger describes the SGM submission to the recent House of Lords Inquiry.

In 1997 the Select Committee on Science & Technology of the House of Lords carried out a Public Inquiry into the increasingly pressing problem of the development of resistance to antibiotics and other antimicrobial agents. Evidence was given to the Select Committee by a large number of individuals, representatives of government departments, of professional and learned societies,[1] of industry and many others.

The SGM submission was compiled by a small working group of Council members consisting of U. Desselberger, G. Salmond, C. Thomas and E. Wellington. Additional advice was obtained from D. Brown, N. Brown, M. Farrington, P. Goodwin, H. Ludlam, K. Smalla and J.D. van Elsas. After a short introduction the SGM report described mechanisms of action of antimicrobial agents, mechanisms of resistance to antimicrobial agents, factors involved in the development of resistance to antimicrobial agents, the epidemiology of drug-resistant pathogens (including *Mycobacterium tuberculosis*, *Staphylococcus aureus*, enterococci, *Streptococcus pneumoniae*, Gram-negative bacilli, *Neisseria gonorrhoeae*, *Neisseria meningitidis* and *Clostridium difficile*), the natural background of bacterial antibiotic resistance genes pointing out the size of the problem, and rapidly emerging data on the development of resistance against antivirals. In the second part of the report control measures were discussed relating to prescription and use of antibiotics, hospital-based control of infection, the rôle of the medical microbiologist, including the production of guidelines for the use of antibiotics, the rôle of the general practitioner, the rôle of government and industry, and the rôle of international collaboration within EU and WHO frameworks. Furthermore, future developments were considered, including novel strategies of drug design, potentially avoiding some of the problems of development of drug resistance against classical antibiotics. Finally, the use of antibiotics was discussed in the context of the development of vaccines, possibly enabling a decrease in the use of antibiotics in the long term.

In more detail, the main points made in the SGM report are as follows:

1. The emergence of antibiotic-resistant bacteria has generally been correlated with the rise and fall of usage of specific antibiotics in clinical practice. However, the chain of causality is not always clear. Appropriate computerized surveillance, linked with modern molecular techniques of detection of antibiotic resistance genes, will help to provide more comprehensive data in the future.
2. The mechanisms of transformation, transduction and conjugation enable antibiotic resistance genes to migrate quickly within bacterial populations and even between different species of bacteria. The mechanisms of homologous and non-homologous recombination and specific integration elements known as 'integrons' enable rapid acquisition of new DNA sequences, and integrons carrying multiple antibiotic resistance genes have been found to be widespread in bacteria isolated in hospitals.
3. There are a lot of data on the epidemiology of drug-resistant pathogens. However, many have been obtained by passive surveillance in hospitals. Therefore, structured active surveillance programmes have been initiated. For practically all the micro-organisms mentioned above, the levels of antibiotic resistance have increased over the past few years (Table 1).
4. The use of modern molecular detection techniques has provided a much better picture of the natural background of bacterial antibiotic resistance genes in the environment, and transfer of genes between many bacteria has also been observed in natural environments. However, there is still a scarcity of data on the prevalence of antibiotic resistance genes in environmental bacteria.
5. A number of epidemiological studies have confirmed the emergence and supply of antibiotic resistance genes in enteric bacteria of animals, following the addition of antibiotics as growth promoters to feed.
6. The number of antivirals with useful applications in clinical and general practice is increasing rapidly. Antiviral resistance has been observed against the most frequently used antivirals, such as aciclovir, zidovudine and also HIV-specific protease inhibitors. In many cases the mutations conveying resistance have been identified. Clinically, tests to identify such resistance patterns with the aim to improve management are just emerging.
7. The development of control measures to counter the development of multiple antibiotic resistance is a daunting task. These include the establishment of rational and moderate antibiotic prescription policies and hospital control-of-infection measures. Consultant medical microbiologists, pharmacists and general practitioners have a leading rôle to play in this. Government can encourage long-term prospective surveillance of antibiotic resistance patterns in humans, animals and environmental microbial isolates. In this context, data and activities of the Public Health Laboratory Service (PHLS) can play a distinctive rôle as the service is based on a network of laboratories. The PHLS has recently refocused on the issue by initiating a new comprehensive surveillance and research programme on antibiotic resistance.

TABLE 1. SIGNIFICANT INCREASE OF RESISTANCE TO ANTIMICROBIAL AGENTS
Examples from the UK and overseas

Bacterium	Resistance against	Degree of resistance				Source
		Year	%	Year	%	
Mycobacterium tuberculosis	Multidrug*	1981	0.6	1995	1.2	PHLS, UK†
Staphylococcus (MRSA)	Methicillin	1990	2.2	1996	13.7	PHLS, UK
Enterococci	Vancomycin	1989	0.4	1995	10.8	USA‡
Streptococcus pneumoniae	Penicillin	1989	0.3	1995	2.9	PHLS, UK
	Erythromycin	1989	3.3	1995	10.9	
Klebsiella	Ceftazidime	1989	2.7	1994	5.7	PHLS, UK
	Ciprofloxacin	1989	2.9	1994	6.5	
Enterobacter	Ciprofloxacin	1989	1.9	1994	7.1	PHLS, UK
Pseudomonas	Ciprofloxacin	1984	4.7	1994	7.3	PHLS, UK
Salmonella typhimurium	Multidrug§	1985	6.0	1996	>70.0	PHLS, UK
	Ciprofloxacin	1994	1.0	1996	12	

* INH, rifampicin, ethambutol.
† PHLS *Antibiotic Resistance in England and Wales*. Evidence presented to the House of Lords, 1997.
‡ McDonald & Jarvis (1997). *Curr Opin Infect Dis* **10**, 304–309.
§ Ampicillin, chloramphenicol, sulphonamides, tetracycline.

8. The development of novel antibiotics is moving away from random screening of collections of microbes or of libraries of chemicals. This change has also been supported by the recognition that natural resistance genes to antibiotics pre-existed in microbes prior to clinical use and that therefore antibiotic resistance emerged relatively quickly in bacterial pathogens. Several approaches to overcome the problem are being taken and include the identification of novel targets in pathogens to develop drugs for which microbes are unlikely to have any natural intrinsic resistance (the targets being proteins involved in cell division, compounds involved in peptidoglycan synthesis, bacterial surface proteins, bacterial elongation factors, bacterial σ factors, protein secretion pathways and drug efflux pumps). The recognition that bacterial pathogens growing at high density produce diffusible signalling molecules switching on or enhancing the production of virulence factors, and modes of interfering with such signalling systems (quorum sensing systems) have attracted particular attention.
9. In the light of increasing levels of antibiotic resistance and of difficulties in developing novel antibiotics, other modes of combating infections should also be considered. Rapid developments in vaccinology have made approaches to protect patients who are particularly vulnerable to microbial infections (e.g. the elderly) with appropriate vaccine programmes conceivable, thus potentially decreasing the overall need for antibiotics and chemotherapeutic agents. To date, vaccines against no fewer than 75 different infectious agents, many of them bacteria, are at various stages of accomplishment, research and development, and comprehensive vaccination programmes could, therefore, in the long term have a beneficial effect in reducing the use of antibiotics.

The report of the Select Committee of Science & Technology of the House of Lords was published in April 1998.[2] Clearly, the Committee was shocked and dismayed by their findings. Major recommendations in the report include:

- prudent use of antibiotics in human medicine supported by a number of surveillance and education measures;
- prudent use of antibiotics in animals, supported by voluntary agreements, but also by legislation if necessary;
- increased attention to infection control and the provision of comprehensive coverage of all NHS hospitals;
- increased structured surveillance of antibiotic resistance patterns using cooperation between BSAC, PHLS, general practitioners, Government agencies and others, including microbiological surveillance schemes covering the population at large with the aim of improving denominator information;
- development of new antimicrobial drugs with an emphasis on the Government giving incentives to the pharmaceutical industry;
- development of vaccines, fostered by the newly established Edward Jenner Institute;
- monitoring of susceptibility patterns against antiviral drugs;
- emphasis on international surveillance in collaboration between WHO divisions and various national surveillance units (e.g. PHLS, CDC, etc.);
- appropriate use of the potential of new information technology to establish comprehensive surveillance data;
- development of a national strategy to safeguard the effectiveness of antimicrobials, backed up with appropriate resources.

In its Fourth Report on the Food Standards Agency bill (published 29 April 1998), the House of Commons Select Committee on Agriculture recognized the importance of a reliable national microbiological surveillance system for food. In this context and with regard to the usage of antibiotics the following conclusion was reached.

> *We consider the evidence of transfer of antibiotic-resistant micro-organisms from animals to humans through food to be approaching conclusiveness, and with the consequences of this potentially so serious, we favour a ban on the use of antibiotics in farming as growth promoters, and tighter restrictions on their use for subtherapeutic or prophylactic purposes.*

This statement emphasizes one of the conclusions reached by the House of Lords Committee in much stronger terms, in recognition of the seriousness of one of the many consequences adverse to human health arising from antibiotic-resistant micro-organisms.

The full text of the SGM report, including references, can be found on the Internet at www.socgenmicrobiol.org.uk/NEWS/sgmhol.htm and the texts of the House of Lords and the House of Commons Select Committee Reports on the Parliamentary web site www.parliament.uk

Ulrich Desselberger, Public Health Laboratories, Cambridge & Oxford, is a member of SGM Council.

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1. AMM, BBSRC, BMA, British Pharmacological Society, BSAC, CAMR, Hospital Infection Society, Institute of Biology, NIBSC, PHLS, Royal College of General Practitioners, Royal College of Pathologists, Royal Pharmaceutical Society, Royal Society, Scottish Microbiology Association, SGM, WHO.
2. 7th Report of the House of Lords Select Committee on Science & Technology (1998). *Resistance to Antibiotics and other Antimicrobial Agents*. London: HMSO.

GENETIC RESCUE OF ENVELOPED RNA VIRUSES: POTENTIALS AND CONSEQUENCES

A ONE-DAY DISCUSSION MEETING was held at The Novartis Foundation (London) on *Genetic Rescue of Enveloped RNA Viruses: Potentials and Consequences*. Papers were presented which highlighted the power of gene manipulation in dissecting the molecular biology and molecular pathogenesis of these viruses and the possibility of using these techniques to generate improved vaccines and novel therapeutics. There was also some debate as to the possibility of generating novel pathogens by manipulating the genomes of enveloped RNA viruses, although it was recognized that these concerns were not unique to this group of viruses. Discussions focused on interspecies barriers to virus infections, the nature of virus glycoproteins and the plasticity of the virus envelope, the interaction of virus and host-cell proteins, the substitution of genes between viruses and the high mutation rates of RNA viruses which may provide the means for allowing chimeric viruses to adapt further (perhaps especially in *in vivo* experiments). Given our poor understanding of virus pathogenesis and the inability to predict the outcome of particular gene manipulations, it was recognized that if the specific aim of an experiment was to modify (or was likely to alter) tissue tropism or host range then consideration should be given to carrying out such manipulations under higher containment conditions than those required for handling the parental virus (or in the generation of a chimeric virus, either parental virus). Also, because of the wide-ranging differences in the types of manipulations being undertaken, the containment requirements for each experiment should be reviewed in line with local and national guidelines.

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Alternatives to Work Placements for Undergraduate Microbiologists

Sandwich placements are hard to come by these days. Jo Verran suggests some successful alternative activities for students.

Joanna Verran

WORK EXPERIENCE SKILLS FOR UNDERGRADUATES

The Dearing Report recommended that measures be taken quickly to make work placements a key part of undergraduate education, alongside core/generic/transferable key skills. Employers continually emphasize the need for graduates with work experience and accompanying skills: self-discipline, initiative, team work, presentation and communication skills and the ability to continue to learn. Thus, in an increasingly competitive job market, graduates need to be aware of and market their skills as well as their qualifications.

The value of industrial placement for the acquisition of transferable skills and work experience is unquestioned. However, increases in student numbers have made it more difficult for universities to find placements, and the concomitant increasing need for students to finance themselves is linked to a reluctance on their part to embark on unpaid placements away from their home or university town. The number of employers offering paid (or even unpaid) placements has also decreased. Therefore, it has become necessary to develop alternatives to placements to account for a potential shortfall.

SKILLS DEVELOPMENT AT MANCHESTER METROPOLITAN UNIVERSITY

At Manchester Metropolitan University skills development is built into the undergraduate biological sciences degree curriculum at all stages. General sessions on skills are included in year one, and in the microbiology route a number of other, innovative activities have been introduced such as posters, leaflets, scrapbooks and case studies, all of which complement the more traditional lab reports, essays and tests. Microbiology-based activities have proved more successful in terms of student participation and learning than those which are directed towards skills acquisition *per se*. Different skills are acquired in the final year when students carry out a project and write up their dissertation, but the work placement and its alternative, the Group Vocational Activity (GVA) which is described below, provide an excellent link between the unit-based skills-directed coursework components in the early stages of the degree, which are usually group activities and time-constrained, and the individual effort required for the final year project and examinations. They also enable students to acquire subject-based and transferable skills over an extended and intensive period.

GROUP VOCATIONAL ACTIVITIES

There are currently three alternatives to the six month industrial placement. Each is worth 30 credits (300 h student effort). One is a more traditional taught option comprising a 2 week 'mini-project' group exercise (10 credits), a student-centred learning examination (an unseen paper with questions based on prepared topics – 10 credits), and a skills-based activity (10 credits). A 'short' GVA comprises 20 credits plus the SCL exam; and the 'long' GVA is 30 credits. Since placement and alternatives are comparable, the assessment must also be comparable – ultimately 'satisfactory' or 'unsatisfactory'. For work satisfaction, it is therefore useful for

TABLE 1. EXAMPLES OF MICROBIOLOGY GVAs

LABORATORY-BASED RESEARCH

- Microbiological cross-infection in dental technology laboratories. These projects have been on-going for 4 years.*
- Coagulase-negative staphylococci, attachment to plastic devices; selection of adherent and non-adherent strains and typing.
- Preliminary development of an ELISA to detect antibodies to Toxic Shock Syndrome Toxin-1.*
- The development of a model to assess the effect of wound dressing on growth and toxin production from organisms infecting burn wounds.

SPONSORED LABORATORY RESEARCH

- The cross-infection potential of works of art in hospital settings.
- The effect of pipework surface roughness on biofilm formation in water distribution systems. The work was subsequently funded for 18 months.*
- Cultivation and maintenance of *Gallionella*.*

EDUCATION

- Video – *Introduction to Practical Microbiology* (30 min) – with accompanying 32-page copyright-waived booklet, intended for school use. Commercially available. Recommended by American Society for Microbiology, Schools Science Review and SGM. Initial costs met by University, and profit made on sale within 6 months.*
- Teaching package for schools on cosmetics microbiology and chemistry, trialled with a local school (see Fig. 1).*
- Guides to galleries (Power Hall, Air and Space Gallery, Electricity Gallery) at Museum of Science and Industry in Manchester. Third year of successful collaboration. Guides trialled with local schools.*
- Development of a web site on useful links for students http://www.mmu.ac.uk/sci-eng/bio/links.htm Information on the relevant GVAs is described at http:/www.mmu.ac.uk/sci-eng/bio/aboutlin.htm †

NON-UNIVERSITY-BASED WORK (DISTANCE SUPERVISION)

- Hospital-based projects. Students on unpaid placements carry out University-directed research projects in collaboration with hospitals.
- Volunteer work in Uganda, fund-raising and public speaking to various audiences on return.

*Publications have resulted from these activities.

†For further information contact Dr J. Bright, Dept Biological Sciences, Manchester Metropolitan University.

staff and students to create and recognize a 'value added' aspect to GVA work.

Long GVA projects are outlined to students alongside placement opportunities. Students apply for both, provide CVs, and are interviewed. This process is important since a long GVA might be seen as an easier option, as there is no examination. Students work in groups of 3–5, under the supervision of a member of academic staff, who receives a nominal time allocation. For the students, the work is virtually full-time (300 h) for 10 weeks, April–June, when teaching commitments are reduced in comparison with the rest of the academic year. Students are enrolled, fees are paid and the work is university-based, thus students do not need to rearrange accommodation or part time jobs.

The versatility of the GVAs is a major strength and is illustrated by the range of past projects described in Table 1. In general, topics reflect staff interests, perhaps as preliminary research projects, projects of educational interest, or those set up informally with an external 'client' providing some 'live' element to the work. In general, the students meet regularly with the supervisor to discuss progress, and the work culminates in some outcome, on which the satisfactory/unsatisfactory assessment is made.

Fig. 1. School pupils guided by university students in laboratory preparation of cosmetics (see Table 1).

EVALUATION

There are benefits of GVAs for all participants.

For the students:

- working with one another
- working with academic staff and clients
- time management
- laboratory skills
- useful preparation for final year project
- written and oral communication
- enjoyment, motivation, satisfaction
- publication, in conference proceedings or in scientific journals

For the staff:

- the opportunity to develop research and educational interests
- extended contact with a small group of students
- informal industrial links without the pressure of consultancy or research contracts
- publications, funding and future work

For the university:

- reputation for innovative additions to the curriculum
- responsiveness to external issues
- sensible use of resources out of intensive teaching periods
- income generation

For the clients:

- financially cheap but otherwise valuable introduction to the university
- minimal staff input
- useful contacts with academic staff
- future collaboration

Limitations of GVAs are few. Topics are inexhaustible, as are potential clients (Readers please note! All enquiries acknowledged!). To date all GVAs have been satisfactory in terms of student assessment, but significantly successful in other ways. Ultimately we hope to place some formal value on skills acquisition and work experience gained in placements and GVAs, for example in comparison with Work-Based Learning programmes or BTEC Common Skills assessment. Sadly, a joint bid (1997) with Liverpool John Moores for funding to develop this route was unsuccessful.

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ACKNOWLEDGEMENT

This paper is a shortened version of one published in the May 1998 edition of *Biomedical Science Gazette* – J. Verran & V.E. Edwards-Jones *Innovations in Teaching: Alternatives to placements for undergraduate medical microbiologists.*

Who Invented the Petri Dish?

Milton Wainwright

As its name suggests, the Petri dish is generally thought to have been invented by an assistant of Robert Koch, called Petri. Here, Milton Wainwright shows that an Englishman, Percy Frankland, has a better claim to the invention.

We take Petri dishes very much for granted, yet it is unlikely that microbiology, or even biology in general, would have developed at the pace it has without them. Nowadays these invaluable dishes come in all sizes, but are almost universally made of plastic. They are light, come ready sterilized and are thrown away by the million. Most microbiologists never give a second thought to the story behind the Petri dish, yet even this simple piece of apparatus has an associated controversy, namely who was it who gave the world this invaluable item of equipment?

Not surprisingly, the person usually credited with the invention of the Petri dish was called 'Petri'. Richard Julius Petri was born in 1852 and died in 1921. In 1886 he was appointed curator of the Hygiene Museum in Berlin and became an assistant in Koch's Institute where he invented his famous dish.

Before the invention of the Petri dish, bacteria were literally grown on plates, an approach introduced by Robert Koch in 1883. These were sterile glass plates on which gelatin was poured. After solidifying, the gelatin was inoculated. The plate was kept moist and sterile by covering it with a glass dome. This is why we still call Petri dishes containing medium 'plates'. Rather than covering the surface with a bacterial culture, Koch added the bacterium to the medium which he found led to better separation of colonies. Incidentally, a certain Fanny Hesse (née Eilshemius), one of Koch's laboratory technicians, apparently suggested the use of 'agar agar' (the original term for agar) after recognizing its useful properties at home, while making jam.[1]

Petri realized that such plates were cumbersome and prone to contamination. As an alternative, he developed the system which we are familiar with, namely a lower glass dish containing the gelatin covered by a glass lid.[2] He then went on to use his dish to isolate micro-organisms from different environments, including soil.

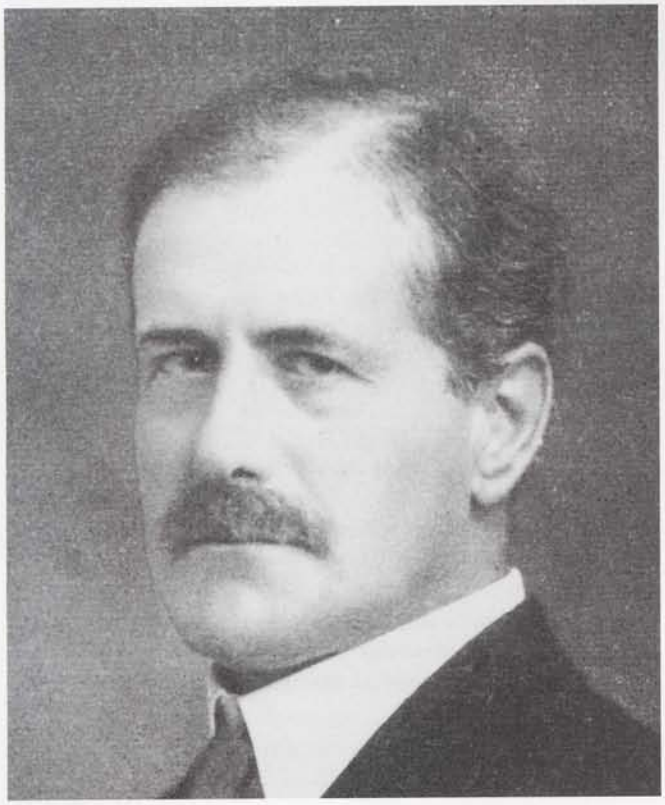

Fig. 1. Percy Faraday Frankland. *Photo courtesy of the Royal Society of Chemistry.*

But was Petri the first person to invent the 'Petri' dish? Well it would seem not. Petri published the paper describing his dish in 1887. A year earlier, the English microbiologist and chemist Percy Faraday Frankland published details of his own dish, which was essentially a Petri dish in all but name.[3]

From 1880 to 1888, Frankland (Fig. 1) was lecturer in Chemistry at the Royal School of Mines in London. He was then appointed Professor of Chemistry first at Dundee (1888–1894) and then Birmingham (1894–1900). Frankland was one of the earliest English workers on bacteriology and made valuable contributions to the study of bacteria in drinking water and following sewage treatment. With his wife (Grace C. Frankland, née Toynbee) he also wrote a book on the microbiology of water as well as a biography of Pasteur.

In 1886, while at the Normal School for Science at South Kensington Museum, Frankland wrote a paper entitled *The Distribution of Micro-organisms in Air* which was presented on 7 June to the Royal Society in London.[3] In this paper he described how he sampled air from various English cities and found that the number of bacteria present varied widely. In particular he noted that when dust was disturbed, the number of bacteria isolated from the air increased dramatically. Initially, Frankland used a somewhat complex experimental method, but at the end of his paper he describes a simpler modification which could be used to sample the bacteria falling from the air. This approach, he suggested, produced results which were more relevant to the question of infection compared to his previous attempts to show how many bacteria were present in a given volume of air. Here is Frankland's description of his work:

> *For this purpose small circular glass dishes rather less than 1 inch in height and about 3 inches in diameter, and provided with a glass cover fitting loosely and overlapping like the lid of a pill box, were filled to a depth of about one-third of an inch with nutrient gelatine and sterilized for fifteen minutes on three successive days in the steamer. As long as the covers are on, the gelatine in the dishes remains sterile for practically an indefinite length of time, and can be transported without danger in a tin box. In using these for experiment, the lid is removed and placed with its mouth downwards on a clean surface, and then after the desired exposure replaced on the dish.*

Frankland included an illustration of his dish in his paper, which is shown in Fig. 2.

Petri's original paper which describes his dish is dated Berlin, February 1887. Frankland's paper, however, appeared in 1886. As a result, Frankland clearly appears to have priority on the invention. However, although Frankland seems to have invented the 'Petri' dish a year before Petri, he does not comment on its wider application for bacteriological culture, but limits its use to collecting and culturing air-borne micro-organisms. In a subsequent paper, again given to the Royal Society, this time on 8 June 1886, he returns to using Koch's plate method for a study *On the Multiplication of Micro-organisms*.[4] It seems, therefore, that although Frankland invented the 'Petri' dish he did not envisage its wider application in microbiology.

If Frankland was the first to invent the 'Petri' dish, beating Petri by a year, why do we not call Petri dishes 'Frankland' dishes? Well, it is possible that Frankland knew of Petri's invention before he published his paper. Since Frankland refers to Koch's work in his paper, and being a Victorian gentleman, it seems unlikely that he would have claimed priority on an invention that was not his own. Of course the question arises, did Petri know about Frankland's paper?

As is often the case with inventions, the dishes proposed by both Frankland and Petri have their origins in an earlier design. In his book *Manual of Bacteriology*,[5] published in 1887, Edgar M. Crookshank shows (on p. 28) a picture of a damp chamber used to incubate potato halves on which bacteria were cultivated; the same apparatus could also be used for incubating glass plates covered with inoculated gelatin. These glass damp chambers were essentially very large 'Petri' dishes and doubtless provided the model used by both Frankland and Petri to develop their dishes.

If publication is the benchmark of priority then Frankland clearly invented the 'Petri' dish before Petri. Some might argue that the dimensions given by Petri for his dish (i.e. 10–11 cm diameter, 1–1.5 cm deep) are identical to the glass Petri dishes which preceded the modern plastic ones, and that these dimensions make it what it is, namely a Petri dish. Frankland's dish is clearly more of a glass pill box. However, the main point of the invention was the use of a glass dish base into which was placed the medium which was then covered by a loose glass lid. Within limits, the dimensions of the dish are immaterial. This is confirmed by the fact that Petri dish manufacturers still refer to dishes that are identical to Frankland's dish as Petri dishes.

As an aside, it is interesting to note that as late as 1927, Petri dishes were sometimes referred to as 'Petri capsules'.[6]

Since Frankland's paper clearly pre-dates that written by Petri, one is left wondering why he was not given credit for his invention from 1886 onwards. Perhaps there is an historical answer of which I am unaware. For the moment, however, there seems little doubt that Percy Frankland was the first person to describe a 'Petri' dish.

Dr Milton Wainwright, Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield S10 2TN.

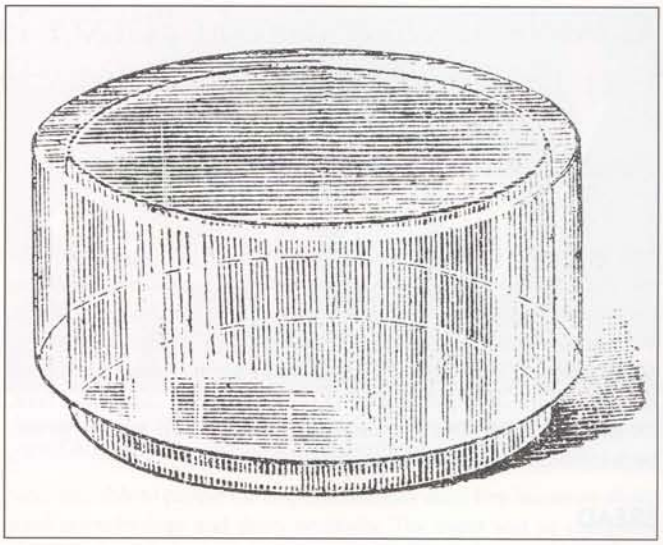

Fig. 2. Frankland's dish. An illustration from a paper published in the year before Petri described his dish.

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Edinburgh International Science Festival 1998: Full Up – the Secrets of the Ploughman's Supper

edinburgh international **science** festival

Janet Hurst

The Festival celebrated its 10th anniversary this year and SGM participated for the fifth year running. We ran a symposium in Old College, jointly with the Society for Applied Microbiology. The capacity audience (ranging from children, through students to senior citizens) was eager to learn about the microbiology behind the ingredients of the ploughman's supper – bread, cheese and beer. Dr Bernard Dixon, SGM member and well known science writer, both introduced the session and chaired it.

BREAD

Dr Phil Voysey, a bread microbiologist at Campden and Chorleywood Food Research Association gave the first talk. The bread market is worth £3 billion a year worldwide; 70% of bread sold in the UK is white. Bread sales overall are falling, but the sale of sandwiches is increasing. Originally bread was unleavened and similar to modern pitta and naan breads, but in Ancient Egyptian times these flat breads were found to rise sometimes due to contamination by natural yeasts. The resulting product was more palatable and the Romans increasingly ate leavened bread. They introduced it to Western Europe. Bread making was a very hit-and miss-process. Brewery sediment was used to make the dough rise, but it was perishable so bakeries had to be situated close to the brewery; the bread often had a bitter taste and did not always rise properly. Bakers then began to use sediment from distilleries and got a more consistent product. It was not until the 19th century that the link was made between microbes and rising dough. Since then the recipe for bread has been constantly evolving, giving rise to the wide range of products that are available today. Yeasts are now created for specific purposes – some fermentations are very fast, whilst others, such as that used to make French bread, are very slow. Tankers are used to make regular deliveries of huge quantities of yeast to bread factories. Dr Voysey explained the chemical reactions that take place in fermenting dough, where many of the by-products in the conversion of sugars to carbon dioxide and alcohol assist the maturation, flavour and keeping quality of the bread, as well as providing its texture.

Courtesy Institute of Food Research

He then described how bread is a moist product subject to spoilage by bacteria, moulds and even yeasts. Most spoilage takes place in the summer months due to contamination with air-borne spores of pink, blue or green moulds. *Bacillus subtilis* causes bread to go 'ropy' – develop sticky strands – a process which takes from 1 to 3 days to develop. It is due to poor hygiene in the bakery, which can also lead to contamination of the outside of cooked bread by baker's yeast itself. The subsequent white patches only show up on brown bread!

Moving to the future, new strains of yeasts are continuously being developed and much research is focused on improving the technology of bread making and the preservation of the product, mainly by packaging innovations. Samples of a wide variety of breads were on display.

CHEESE

Christine Ashby, a consultant in cheese and fermented products for Milk Marque Development Centre, noted that the earliest known reference to cheese is in 1800 BC. As with bread, the Romans were responsible for the spread of cheese outside the Mediterranean and the text of a recipe for cheese exists which is dated 120 BC. Cheese is a very variable product, reflecting the milk from which it is made. Factors include the stage of lactation of the animal, the breed, the type of animal feed and even the climate. Miss Ashby then dazzled the audience with some statistics before going on to describe the cheese-making process. There are 34,000 dairy farmers in the UK, tending 2.5 million cows which produce 38 million litres of milk a day. Half is drunk as liquid and 9 million litres are concentrated down into the 1 million kilos of fat and protein mixture that cheese comprises. As we eat 1.5 million kilos every day, the rest is imported from countries like France. Most cheese made and consumed in the UK is cheddar, but the speaker chose to illustrate the manufacturing process with the blue cheese, Stilton, as this is a more complex microbial product.

Before conducting a slide tour of a Stilton factory, she outlined the basis of all cheese making in which lactic acid bacteria are inoculated into warm milk, break down the lactose producing lactic acid which in turn coagulates the milk protein casein, causing it to separate out into curds (solid) and whey (liquid). An enzyme, chymosin, traditionally obtained from rennet in calves' stomachs but now mostly (95%) made by genetically engineered bacteria, is then added to the souring milk to continue the coagulation process. The texture of the curd varies according to the type of cheese from loose (such as cottage cheese) to very tight (e.g. Parmesan). Most starter organisms are obtained from a culture bank and these are selected for the required characteristics such as proteolytic activity and acidity, resistance to heat and tolerance to salt. Many starter cultures are mixed cultures; they can sometimes become infected by bacteriophages. The maturation of cheese is due to the action of microbial enzymes which come from organisms, mainly lactic acid bacteria, in the environment of the factory, not the starter culture. Research is being carried out by starter culture companies to try and identify these so that cultures can be sold.

In the case of Stilton, inoculation by *Penicillium roquefortii* provides the blue colour and contributes to the flavour of the cheese, whilst the mixture of bacteria and moulds which forms the surface coat of the cheese is characteristic of particular factories. Experts can identify the manufacturer of Stilton cheeses from the taste and texture of the product. Examples of different Stiltons were available on taste at the end of the session which illustrated this point. Stilton is actually a trademark and it can only be made according to strict criteria in three English counties. Its manufacture is governed by a trade association.

BEER

Finally, Professor Geoff Palmer, Heriot-Watt University, gave an entertaining talk on brewing, noting that cereal crops are the common basis of all the ingredients of the ploughman's supper, providing the flour for bread, the feed for dairy cows and the malt for making beer.

Beer is such a complex product that it is impossible to analyse it. The main ingredients are barley, hops, yeast and water. In the malting process grain is steeped in water, spread out, allowed to germinate for five days and turned daily before being kiln-dried. The temperature used for drying differs according to the type of beer – high temperatures are used for malt intended for ale manufacture, low temperatures to produce lager malt. Stouts require a very dark malt. Malt affects colour and flavour. It is now produced on a huge commercial scale using advanced technology, whereas in the past the skill and experience of the operator was vital. During malting the starch is turned to a range of wort sugars and dextrins and the proteins to amino acids, providing substrates for the yeast. A natural hormone is also produced by the malted barley which enhances the brewing process, but now an artificial version is used. The malt is milled and an extract prepared which is then boiled up with hops ready for the yeast to be added. Hops are mainly grown in Kent. The plant has glands which break open during boiling and release the component which gives beer its bitter taste. Hops also contribute fruity flavours and affect the head. They were introduced by Flemish traders in the early 17th century; until 1700 it was illegal to add hops to beer.

Courtesy George Bishop & Partners

Professor Palmer concluded by describing the fermentation process, where the type of vessel and yeast, together with ingredients such as sugars, protein, vitamins and amino acids, all contribute to the final product. An open vessel, where the yeast floats, produces an ale, whereas lagers are made in closed vessels with a yeast that sinks. In modern brewing the conditions are closely controlled by high technology methods to give the desired alcohol and gas content. After brewing the beer is pasteurized. Professor Palmer asserted that pathogens cannot live in beer, thus making it safer to drink than the water in many countries!

Courtesy Institute of Food Research

After a hectic question and answer session the audience was able to sample a range of breads, beers and cheeses, ably assisted by barmaids in the guise of Janet Hurst of SGM and Ann Baillie, Alison Devereux and Diane Roberts of SfAM. Such was the stampede that there was nothing left over but crumbs and several elderly Edinburgh ladies were to be seen swaying slightly as they left the lecture theatre. The speakers were buttonholed to answer many more questions after the end of the official discussion and members of the audience were also able to peruse the displays and take away free literature about food microbiology and dairy products. The event was so successful that it only ended when the janitor arrived to lock up the building.

Speakers at the 1998 Edinburgh International Science Festival. *From left to right*: Christine Ashby, Bernard Dixon, Geoff Palmer and Phil Voysey.

We are most grateful to the chairman and speakers for their enthusiastic participation in the session and for providing samples of food and drink.

Janet Hurst, External Relations Office, SGM.

UNIVERSITY OF CARDIFF
7–11 SEPTEMBER 1998

EXPLORE SCIENCE, ENGINEERING AND TECHNOLOGY AT THE 1998 FESTIVAL.

BRITISH ASSOCIATION ANNUAL FESTIVAL OF SCIENCE

The programme includes:

- a wide variety of talks and discussions with leading scientists presenting the newest developments in their fields
- a fun-packed hands-on programme for families and young people
- exhibitions showing the application of science and technology in industry and the world around us
- a series of lunchtime and evening public lectures
- visits and field trips to local areas of scientific interest
- debates on a broad range of ethical and social issues

Residential accommodation is available. Further information about the meeting may be found on the Web at www.britassoc.org.uk or by contacting British Association Major Events Department, 23 Savile Row, London W1X 2NB (Tel. 0171 973 3075; Fax 0171 973 3051; Email ba.major.mgr@mcr1.poptel.org.uk).

Micro-organisms for Investigations in Schools and Colleges

IN 1996 the DfEE published *Safety in Science Education*, which aimed to give up-to-date advice on safety procedures for school laboratory practicals. The chapter on microbiology contained many errors and the list of organisms suggested as suitable for use in schools did not take account of an easing in the hazard categorization of certain micro-organisms which had been published in 1995 by the Advisory Committee on Dangerous Pathogens. Following representations from the Microbiology in Schools Advisory Committee and other bodies, a conference was convened by the Association for Science Education to address these issues. SGM was represented at the meeting and the outcome was a revised version of the microbiology chapter in the book, which has been passed to DfEE for action, and an evaluation of the list of recommended micro-organisms. A new list has been prepared which names suitable organisms, gives points of educational use and interest and comments on the ease with which the organisms can be cultured and maintained. The list is not definitive, as clearly other micro-organisms may be used if competent advice is obtained.

Members who are involved in promoting microbiology to schools may find the list useful. Copies are available from the External Relations Office, SGM HQ (Email info@socgenmicrobiol.org.uk).

SocietyNews

May Council Meeting

House of Lords Report on Antibiotic Abuse

MEMBERS OF COUNCIL noted with approval that the Society's submission had been cited in the recent report of the Lords Select Committee on Science and Technology (see p. 94 for details). Although it was gratifying to see that the Committee had taken quite a hard line on the unnecessary prescribing of antibiotics for medical use, it appeared to Council that more could be done to strengthen limits on their use as feed additives in agriculture. It was agreed that a scientific meeting to bring together interested parties to encourage dialogue on this issue could usefully be organized by the Society.

House of Commons Inquiry into the Scientific Advisory System

THE SOCIETY had submitted some comments and suggestions to this ongoing inquiry, urging in particular that major learned Societies such as the SGM should be consulted more often when the Government needed expert scientific advice, rather than relying principally on internal advice from its own departments. Council noted, however, that if the Society were to be consulted on a regular basis, often at short notice, a mechanism would be needed for rapidly identifying individual members with appropriate expertise and a willingness to formulate an opinion.

Criteria for Fleming Lectureship and Honorary Membership of the Society

FOLLOWING CONCERNS EXPRESSED by some members about the criteria enabling nominees to be judged, a working party had considered the issue carefully. It recommended that in future years, both of these Society awards would be open to individuals without restriction on nationality or place of work, but that a contribution to the Society in some form, e.g. by having made a presentation at a scientific meeting or publication in a Society journal, would be a prior condition for the individual concerned. The exact wording has yet to be finalized and will be published in the *Quarterly* in due course. As always, Council wishes to encourage as wide as possible a field whenever nominations for these awards are considered.

Teaching and the Quality Assurance Agency

THE PROFESSIONAL AFFAIRS OFFICER alerted members to the recently published consultation paper of the QAA, which was soon to begin work on development of a national programme of quality assurance in higher education, including an element of 'benchmarking' of national standards and probably in due course curricula. Concern was expressed about a number of aspects, particularly the likely extra bureaucratic burden it would place on hard-pressed university teachers to the detriment of their actual teaching duties. The timescale for consultation was short, and formulation of a response was difficult in light of the complexity and detail of the material in the consultation document. Although the deadline is past even as we go to press, comments and debate in these columns in the coming months would be constructive in informing Council of the views of the membership for transmission to the Agency where possible.

Electronic Publication

COUNCIL TOOK THE DECISION to go ahead with electronic publication of the Society's journals through the media of a number of specialist organizations, notably the not-for-profit HighWire based at Stanford University in California (see p. 111). It was clear that top quality international journals were universally adopting electronic publication, and the Society could not aspire to like status without taking this step. Policies on charging and pricing would be developed with caution, as and when market trends became clearer.

Society Lectures

IN SEVERAL INSTANCES in recent years, invited prize lectures at Society meetings have attracted disappointingly small audiences. A suggestion that a late morning slot would be more likely to attract audiences due to the lack of distraction by an early start to evening social activities, was well received.

Report of the Editor-in-Chief of the IJSB

PROFESSOR ERKO STACKEBRANDT reported on the successful transfer of publication of the journal from the American Society for Microbiology to the SGM. He was fulsome in praise of the efforts made by the permanent staff of the Society to ensure an extremely rapid and efficient transition and the publication of the first issue under SGM auspices with a new design and only a couple of months' delay. Very few institutional subscriptions had been lost in the transfer; the submission rate was buoyant, and he looked forward to the continuing success of the journal. Any member who may find the journal relevant and useful in their work who has not yet seen a copy would be well advised to do so and consider subscribing – it is excellent value!

Charles Penn, General Secretary

STAFF NEWS

WELCOME TO Hazel Hatton who has joined the team of editorial assistants to provide part-time secretarial help to IJSB and *Microbiology*. Hazel previously worked for the former Berkshire County Council in the Education Department where she was Quality Assurance Manager.

UK Register of Expert Witnesses

SUITABLY QUALIFIED SPECIALISTS in microbiology who have experience of expert witness work, or plan to practice it, are invited to submit details for inclusion in the database. It is used by members of the legal profession engaged in litigation work. The entries are also published in the form of an annual book and in 1998 there will be a new on-line version at **www.jspubs.com**. Contact Debby Dyson, JS Publications, PO Box 505, Newmarket, Suffolk CB8 7TF (Tel. 01638 561590) for details.

Notices

Annual General Meeting 1998

THE ANNUAL GENERAL MEETING of the Society will be held on **Tuesday, 8 September 1998** at the University of East Anglia. Agenda papers, including reports from Officers and Group Conveners, and the accounts of the Society for 1997 are in the separate booklet distributed to all members with this issue of the *Quarterly*.

Microscene Noticeboard

AT THE SEPTEMBER MEETING of the Society at the University of East Anglia, a board will be set up with notices of jobs, postdoctoral positions, studentships, courses, conferences etc. Contributions are welcome and may either be brought to the meeting or sent beforehand to Janet Hurst at Marlborough House.

SGM Web Site News

'Microbiology in the News' Database

THE EXTERNAL RELATIONS OFFICE is pleased to announce that the electronic version of *Microscene* is now available on the Society web site. Instead of a digest of newspaper clippings of articles on microbiological topics, *Microbiology in the News* is a database of references. The references are classified into 16 main areas:

- *General interest*
- *Medical microbiology*
- *Infectious disease*
- *AIDS/HIV*
- *BSE/CJD*
- *Biotechnology*
- *Food microbiology*
- *Public health*
- *Environmental microbiology*
- *Agricultural microbiology*
- *Animal disease*
- *Extra-terrestrial life*
- *Business news*
- *British science*
- *World science*
- *Science communication*

which are then subdivided under further subject headings. Each reference has a list of keywords which indicates its content. The full text of most of the articles can then be accessed via the web site of the newspaper or periodical where it was published.

Currently the database is not as comprehensive as it will be ultimately, but it does reflect the themes predominating in the printed media at the end of 1997 and the early months of 1998.

SocietyNews

Grants & Awards

Seminar Speakers Fund

THE PURPOSE of the Seminar Speakers Fund is to promote talks on microbiological topics in departmental seminar programmes. Applications are invited from Higher Education Institutions where microbiology is taught for grants of up to £200 towards the travel, and if necessary, accommodation, expenses of an invited speaker. Applications will be dealt with on a first come, first served basis during the academic year, which is defined as running from September 1998 to June 1999. Written submissions should be sent to the Grants Office at SGM HQ for consideration. Details of the scheme were published on p. 67 of the May *Quarterly*.

Fund for Developments in Teaching

MEMBERS MAY APPLY for grants to support projects intended to lead to an improvement in the teaching of any aspect of microbiology relevant to secondary or tertiary education in the UK. Examples of work which might be funded include the provision of teaching materials (e.g. videos, slides, posters), the development of reliable, novel practical exercises, new approaches to teaching/learning familiar concepts (e.g. computer simulations or tutorials) or any other appropriate aspect. Grants are also available to assist members wishing to visit overseas higher education institutions to study methods of teaching large classes. The full rules of the scheme were published on p. 67 of the May 1998 issue of the *Quarterly*. Application forms are available from the Grants Office at SGM HQ. The closing date for applications is **30 October 1998**.

UNESCO–IUMS–MIRCEN–SGM Short Term Fellowships 1998

THE FELLOWSHIPS provide an opportunity for a young microbiologist from a developing country to pursue, or complete, a part of an on-going research programme in a laboratory in a developed country. Applicants should be a permanent employee in the country of residence, be aged under 45, must have completed at least 5 years of postdoctoral experience in any of the microbiological sciences and must provide specific evidence in the form of a proposal about the work which is to be performed at the host laboratory. Up to US$4,000 may be awarded for travel and subsistence for a maximum period of 3 months. Full details of the scheme and the method of application were published on p. 32 of the February 1998 issue of the *Quarterly*.

Details of all SGM grant schemes are now on the web site at http://www.socgenmicrobiol.org.uk

Most application forms can be downloaded. Requests for paper copies or any inquiries should be made to the Grants Office at SGM Headquarters: Tel. 0118 988 1821; Fax 0118 988 5656; Email grants@socgenmicrobiol.org.uk

1999 IUMS INTERNATIONAL CONGRESSES

Sydney Convention Centre, Australia

See p. 108 for details of the programmes of these events and the travel grant scheme for SGM members.

SGM MEMBERSHIP SUBSCRIPTIONS 1998

All members receive the *SGM Quarterly*; in addition they may take any of the Society's journals.

ORDINARY MEMBER		
Membership Subscription (inc. *SGM Quarterly*)	£35.00	(US$60.00)
Additional subscriptions for publications:		
Microbiology	£56.00	(US$100.00)
JGV	£56.00	(US$100.00)
International Journal of Systematic Bacteriology	£45.00	(US$70.00)
STUDENT OR RETIRED MEMBER		
Membership Subscription (inc. *SGM Quarterly*)	£15.00	(US$25.00)
Additional subscriptions for publications:		
Microbiology	£28.00	(US$55.00)
JGV	£28.00	(US$55.00)

INTERNATIONAL DEVELOPMENT FUND

MEMBERS ARE REMINDED that Council has established an International Development Fund for competition this year. The purpose of the Fund is to make small grants available to help microbiologists in developing countries and Eastern Europe. Members may apply for funding to run training courses in laboratories in developing countries appropriate to the needs of those countries, or for any other small project to assist in technology transfer from Western Europe. Full details of the scheme were published on p. 68 of the May 1998 issue of the *Quarterly*. The closing date for applications is **25 September 1998**.

Vacation Studentships 1998

IN 1995 Council instituted a scheme to enable undergraduates to work on microbiological projects during the summer vacation before their final year. The studentships are intended to provide undergraduates with experience of research and to encourage them to consider a career in laboratory-based science. Support is provided at the rate of £120 per week, for a maximum period of 8 weeks. A small sum may also be awarded towards the cost of consumables. Students are required to submit a brief report of their research on the completion of the studentship, which in itself is a useful exercise for them. The scheme has proved to be very successful and popular. This year 56 applications were received. After careful scrutiny by referees and the Award Panel, studentships were offered to 38 applicants. This is a gratifyingly high success rate, reflecting the greatly improved standard of applications in 1998. A list of awardees is available from the SGM Grants Office on request.

Council has set aside a further sum to fund vacation studentships next year. Full details of the 1999 scheme will be announced in the next issue of the *Quarterly*.

SocietyNews

Kathleen Barton-Wright Lecturer 1998

Bruce Holloway

The Less Travelled Road in Microbial Genetics

MY FIRST DEGREE was in Botany and Bacteriology from the University of Adelaide in 1948. In 1952 I went to Caltech and obtained my PhD in *Neurospora* genetics under George Beadle. I returned to Australia to the newly established Australian National University where I started working on the genetics of *Pseudomonas aeruginosa*. In 1957 I joined the Bacteriology Department of the University of Melbourne until 1968 when I moved to Monash University to be Foundation Professor of Genetics, staying there until I retired in 1993. During this period many good collaborators from Australia and overseas worked in our group at Monash to expand our knowledge of the genetics of the genus *Pseudomonas*. A feature of this time was the interactions we established with laboratories in other countries. This work included the development of systems for genetic analysis which were applicable to other organisms. For example, we were the first to achieve genetic mapping in methylotrophs. My lecture will be partly historical in describing some of the problems we needed to solve to extend genetic analysis to genetically less popular bacteria. I shall also highlight current developments in genome analysis that have made classical bacterial genetic approaches redundant.

New Treasurer

Peter F. Stanbury

AT ABOUT 16 I was torn between botany and engineering. The former arose from my father's occupation as a nurseryman and the latter from an enthusiasm for Meccano! Botany won. I sold my Meccano (a rash decision!) and spent three exceptionally happy years at Aberystwyth. Wareing's department was a hive of activity with the discovery of abscisic acid. Although I loved plant physiology, it was Muriel Rhodes-Roberts' (Aunty μ!) introduction to bacteria which really fired my enthusiasm. In my final year I began to appreciate that microbiology and engineering were compatible bedfellows and, after graduating, went on to the biochemistry department at Imperial College to take an MSc in Microbial Biochemistry and Fermentation Technology. Geoff Banks, Karl Bettelheim, Mike Carlisle, Tony Mantle and Archie Fleming continued to feed my interest in micro-organisms, especially their large-scale culture.

Mike Carlisle drew my attention to a lectureship at the Hatfield Polytechnic and, to my absolute astonishment, I was appointed! That was in 1970 and I'm still there (albeit now the University of Hertfordshire)! Biological Sciences was then headed by Ken Thomas who, along with several other polytechnic heads of biology, pioneered the Applied Biology sandwich degree in the polytechnic sector. These were exciting times in a very young department where responsibilities were allocated regardless of age. Neil Smith was head of Microbiology and his enthusiasm, amazing sense of humour and 'off the wall' ideas made for a very successful group. With Neil's guidance the group (in particular Virginia Bugeja, the late David Cohen, Ike Gibson, Elliot Gingold, Avice Hall, David Odell and Allan Whitaker) developed courses and research in microbial physiology, ecology and industrial microbiology as well as starting Hatfield Poly along the road of short course teaching and consultancy.

Twenty-eight years is a long time to have spent in one department but I have been allowed out occasionally for 'good behaviour'! The first was a short sabbatical period in 1972 at ICI's fermentation plant at Trafford Park (now closed) where I was able to gain some badly needed industrial experience. In 1985 I spent 6 months at Warren Spring Laboratory working with Norman Le Roux on thermophilic copper leaching by *Sulfolobus*. This was enormous fun and we developed (along with sandwich student John Buckingham) a pilot-plant continuous air-lift reactor for the thermophilic leaching of chalcopyrite – really big Meccano! My interest in *Sulfolobus* continued and Norman is now a visiting Professor at Hertfordshire. A short time in Czechoslovakia followed, where I met Vladimir Betina. Vladimir was a superb host and his expertise in fungal secondary metabolism was quite inspirational. I was delighted to be able to invite him to speak at an SGM symposium on *Fungal Fermentations*. In 1992 I was very fortunate to be awarded a British Council/Japanese Ministry of Education-sponsored visiting Professorship at Kyushu University, Fukuoka, Japan to work with Ayaaki Ishizaki who had translated into Japanese a text written by Allan Whitaker and myself. This was a tremendous experience for me and my family – especially once the kids had learnt the polite pronunciation of 'Fukuoka'! A joint research programme has been developed with the Japanese group on xylose utilization by *Lactococcus lactis*. Also, we are establishing an undergraduate and postgraduate exchange programme with Kyushu.

I have served on the Fermentation & Bioprocessing Group Committee (1986–89) and was Convener from 1990 to 1995. I look forward to the opportunity to serve the Society in the future and trust that I am able to exercise the level of financial judgement achieved by Allan Hamilton and his predecessors which has resulted in the current healthy state of the SGM.

News of Members

Professor S.P. Borriello has been elected to Fellowship of University College London and appointed as Visiting Professor by the London School of Hygiene and Tropical Medicine.

Dr Tim Foster of the Microbiology Department, Trinity College, Dublin, has been appointed to a personal chair with the title Professor of Molecular Microbiology.

Dr John R.W. Govan has been awarded an Honorary Professorship in Microbial Pathogenicity at the University of Edinburgh.

Professor Rod Herbert, Dept of Biological Sciences, University of Dundee, has been elected a Fellow of the Royal Society of Edinburgh.

Dr David Phoenix has been awarded a Readership in the Department of Applied Biology, University of Central Lancashire.

Professor Ray Spier, former Professor of Microbiology at the Animal Virus Research Institute and Fellow of the Institution of Chemical Engineers and of Biology, has been appointed to the University of Surrey's first Chair of Science and Engineering Ethics.

Dr Mumtaz Virji, Department of Pathology and Microbiology, University of Bristol, has been appointed to the Chair in Molecular Microbiology.

Dr Graeme Walker has been awarded a Readership in the School of Molecular and Life Sciences, University of Abertay, Dundee.

The Society notes with regret the deaths of ***Professor Keiran Dunican***, Irish SGM Branch Convener 1975–77 (member since 1966), ***Professor M.D. Lilly*** (member since 1960) and ***Dr Susumu Maeda*** (member since 1979).

Dear Editor

Many of the readers of the *Quarterly* will probably be enchanted with Professor Pennington's comments on the worldwide failure to protect our citizens against food-transmitted infections and intoxications.[1] Though indeed dealing with a specifically UK initiative it enunciated a few correct and universally applicable statements that merit deep appreciation and whole-hearted support.

Unquestionably none of the generally adopted safety management strategies – whether retrospective and in essence futile,[2] or else prospective like the EU Hygiene Directive 93/43, apparently not adequately heeded or implemented – work well. Professor Pennington, who has gone through the mill in Scotland like few physicians before, is beyond doubt qualified to expound this verdict. And his questioning whether future protection scenarios should also afford maximal protection to the 'YOPI-segment' (worst off) amongst the population calls for an unconditional affirmation from the profession.

Rightly, Professor Pennington emphasizes the many scientific uncertainties that yet frustrate the epidemiology of food-transmitted infections, which have unfortunately engendered absence of consensus about avenues to their control. Nonetheless may we point out, with all due deference, that, in spite of these deterrents, a substantially improved protection of the public is readily within reach. It requires a culture change to extend the fabulously effective intervention strategy heralded by Sir Graham Wilson,[3] i.e. pasteurization of dairy products and the structured decontamination of raw meats and poultry before allowing these perennially infected primary products entry to the food and catering chains. Innovating technologies are available for application, if so decided, by tomorrow. In the US this approach to markedly improved health protection has already been made mandatory under the simple designation of pathogen reduction. It will effectively 'eliminate' bacterial, in some instances also parasitological and viral hazards, though management of the risk of prion transmission will have to rely on asepsis rather than elimination.[4]

While trying in the UK to stem the inexorable advance of fully preventable food-borne infections,[1] it may be worthwhile to take this development in food safety management into account. The capital role of academia in preparing the minds of future public health professionals for this culture change might merit further attention. Proceeding in this way the UK may take leadership in restoring eroded public confidence in microbiological food safety. Few European experts in this area will not support it.

Yours sincerely

Professors David A.A. Mossel and Corry B. Struijk, The Eijkman Foundation, Utrecht University, PO Box 6024, 3503 PA Utrecht, The Netherlands (Fax +31 30 2948687).

References:

1. PENNINGTON, T.H. (1998). *SGM Quarterly* **25**, 50–51.
2. WILSON, G.S. (1973). In *The Microbiological Safety of Foods*, pp. xi–xii. London: Academic Press.
3. WILSON, G. (1933). *Lancet* **ii**, 829–832.
4. MOSSEL, D.A.A. *et al.* (1998). *Int J Food Microbiol* **40**, 211–243.

Dear Editor

The Editorial *So what is Microbiology?* in the August 1997 issue of the *Quarterly* referred to the importance to the health of the subject of the recruitment of good students to places on microbiology courses. In this regard we should all recognize the support given by SGM to publicizing microbiology in schools and colleges and the valuable work of Marlborough House staff. Another strand that makes its contribution *inter alia* is provided by the various guides to degree courses, the contents of which are coming under greater scrutiny by potential applicants and their parents with the changes in funding arrangements. Most commercial guides need to try to deal so comprehensively with institutions and degree subjects that, to academic eyes anyway, their value is limited. The purpose of this letter is to remind those SGM members who are involved in recruitment or admissions to be on the look out for this autumn's request to universities for information for the biennial revision of a particularly useful one, i.e. the *CRAC Degree Course Guide 1999/2000: Microbiology, Immunology & Biotechnology*, for publication in June 1999.

The guide is one of a series produced by the Careers Research and Advisory Centre (CRAC) and published by Hobsons. The series consists of 35 separate subject area guides, including one for biology where courses with microbiology as a minor component are to be found. It is probably the only publication that deals with subject courses in depth and draws on specialist academic guidance at every revision of each guide. As it happens, the academic input to the microbiology one has come from an SGM member for as long as I can remember. I took over from the late Geoff Callely (Cardiff) in 1980 when he became SGM's first Publications Officer; his predecessor was Jack Hopton (Birmingham).

The value put by institutions on this publication is reflected by the impressive response to requests for information for the revisions. One factor may be the way in which the guides continue to evolve, both in coverage and detailed content. For example, bacteriology was dropped from the title of the microbiology one in 1983 and biotechnology was added in 1995. Also, the text and the tables that show course topics, assessment procedures, etc. for each institution are reviewed by the academic consultant at each revision in an effort to reflect changes in course structure and procedures and also developments in the subject. Therefore, it is important to keep the institutional eye on the ball when the revision request comes round. By the way – did really only 6 of the some 100 courses at the 57 institutions listed in the 1997/98 edition include the *Archaea* in the final year?

Yours sincerely

John Grainger, School of Animal & Microbial Sciences, University of Reading.

International Development Fund Report: Culture Collections in Belarus

Alex Pesnyakevich

The disintegration of the Soviet Union and changing political conditions in the world have had a significant effect on science in all the post-Soviet states, including the Republic of Belarus. Scientific research was financed completely from the state budget of the Soviet Union and the achievement of independence by Belarus has not changed this situation. All research establishments in the Republic are having a bad time. Despite these financial stringencies and the loss of qualified staff to the scientific establishments of other countries or moves into other, higher paid spheres of activity, microbiological research in the Republic of Belarus carries on.

The important role of microbial culture collections is universally accepted and most countries support a network of establishments to maintain and preserve various strains of micro-organisms. During the Soviet period all the scientific and industrial establishments of the allied republics used centralized collections of cultures based in Moscow and St Petersburg. However after the disintegration of the Soviet Union, all these collections became the official bodies of Russia, thus significantly complicating their use by Belarusian microbiologists. It became clear that the Republic of Belarus required its own microbial culture collections. Two main scientific establishments were chosen for the creation of collections of nation-wide importance: the Institute of Microbiology of the Academy of Sciences of Belarus and the Belarusian State University (BSU).

The BSU was selected because it has had a microbiology department since 1961, where broad research into the genetics of micro-organisms has been performed since 1967 under the direction of Prof. Yu.K. Fomichev. The research at BSU focuses on bacteria of the genera *Erwinia* and *Pseudomonas* with agricultural and industrial significance. Results have included the genetic mapping of *E. chrysanthemi* ENA49 and *E. carotovora* subsp. *atroseptica* 3-2 and information on genetic regulation of the production of pectinolytic enzymes, aromatic amino acids and siderophores.

Such research produces many genetically modified strains of the bacteria under study. In addition, a set of natural strains of *Erwinia* and *Pseudomonas* have been isolated from various sources in the territory of the Republic of Belarus by employees and students of the university. The collection of cultures has also been replenished by the receipt of type strains from collections in Japan, Great Britain, Czechoslovakia, USA and the former Soviet Union. A significant number of strains and plasmids have also been received from other laboratories around the world or obtained as a result of research at BSU. The total number of bacterial strains in the microbiology, genetics and biotechnology departments and in the laboratory of bacterial molecular genetics was about 15,000 in 1997.

To our regret the difficult financial situation of our republic has not allowed the government to allocate enough resources for the proper transport and storage of such a large number of strains. In this connection in 1995 I, as a member of the SGM, applied to the International Development Fund of the Society for financial support for the Department of Microbiology of the BSU to create and develop a collection of stock cultures of micro-organisms. Our request was successful and £5,000 was allocated.

The management and all staff of the biological faculty at BSU are sincerely grateful for this grant. But the allocation of money did not solve our problems completely, as financial and trade systems of the Republic of Belarus did not allow a normal transfer of the award to us. It only became possible to purchase the necessary equipment thanks to voluntary help from the Scottish Crop Research Institute and particularly Dr Gary D. Lyon, with whom we keep in constant communication and carry out joint research on phytopathogenic *Erwinia*. It was this very kind person who arranged the purchase and transfer to Belarus of the necessary equipment for work with cultures of micro-organisms together with a laser printer.

In addition, Dr Lyon rendered invaluable help in organizing the visit of Dr R.A. Zheldakova, who supervises development work on the Collection of Micro-organisms of the BSU, to the UK to participate in a training course *Culture Preservation Techniques for Bacteria and Filamentous Fungi* that took place on 29–31 October 1997 at the International Mycological Institute. This visit was also financed by the International Development Fund and has been very useful from the point of view of both access to new information and the establishment of new contacts with microbiologists from different countries. Dr Zheldakova wishes to express her sincere gratitude to Dr D. Smith, Mrs J. Kolkowsky and Mrs S. Groundwater for their hospitable reception and support during her visit.

At the moment work on the lyophilization of cultures of micro-organisms and their transport is being carried out using equipment purchased with the grant. By the beginning of 1998 more than 1000 strains had been entered into the growing catalogue of bacterial cultures and this work is proceeding despite the continuing lack of funding for scientific research in our country. The employees of the Department of Microbiology of the BSU, who carry out this work, express sincere gratitude to their British colleagues for the help rendered. The resultant culture collection will become the basis of the development of further microbiological research in Belarus.

Dr Alex D. Pesnyakevich, University of Belarus (Email cmbu@bio.bsu.unibel.by).

ACKNOWLEDGEMENT

I express sincere gratitude to E.A. Nikolaichik for help in preparing the English text of this article.

International Union of Microbiological Societies (IUMS) Congresses 1999

Sydney Convention Centre, Australia

The XIth International Congress of Virology and the IXth International Congresses of Bacteriology & Applied Microbiology and Mycology are to be held at the Sydney Convention Centre, Darling Harbour, Sydney, Australia in 1999. The Virology Congress takes place from 9 to 13 August, whilst the other two congresses are in the following week from 16 to 20 August. Exciting programmes are being arranged which will cover many of the subjects of current interest to microbiologists.

XIth International Congress of Virology 9–13 August 1999

The programme will comprise five morning plenary sessions, which will cover topics at the cutting edge of the discipline presented by invited speakers, and over 64 afternoon workshop sessions which are for offered papers. In addition, several special topic and industry symposia sessions will be held in the late afternoon and early evening. The five morning plenary symposia are *Virology in the 21st Century*, *Structure and Assembly of Viruses*, *Molecular Biology and Disease Control*, *Immunology and Pathogenesis* and *Emergence and Evolution of Viruses*. An additional Plenary Symposium will be held on the final afternoon entitled *Eradication of Poliovirus: an International Achievement to Start the Next Millenium*. Over 128 internationally recognized virologists from 26 countries have accepted invitations to co-chair the 64 workshops; the co-chairmen will select eight offered abstracts for oral presentation in each workshop, and all other offered abstracts will be presented as posters. Thus, there will be approximately 30 invited speakers and 512 offered oral papers. The workshop topics are listed below.

Adenoviruses
AIDS animal models
Alpha- and rubiviruses
Ambisense-RNA viruses
Antiviral agents
Arboviral diseases
Bacteriophage replication
Baculoviruses
Bornaviruses
Calici- and astroviruses
Cellular immunity to viruses
Corona- and arteriviruses
Cytokines and interferons
Cytomegalo- and EB viruses
DNA vaccines
Emerging viral diseases
Filoviruses & filo diseases
Flaviviruses
Geminiviruses
Hantaviruses
Hepatitis B
Hepatitis C
Herpesviruses
HHV-8
HIV pathogenesis
Host resistance to viral infection
Industrial & environmental aspects of phage
Insect–virus cell interactions
Intracellular transport of viral components
Luteoviruses
Lysogeny, lysogenic conversion & phage–host interactions
Negative strand RNA viruses: replication/transcription
Opportunistic virus infections
Orthomyxoviruses
Papillomaviruses
Paramyxoviruses
Parvoviruses
Persistent virus infections
Picornaviruses
Plant virus replication/recombination
Positive strand RNA viruses: replication/transcription
Poxviruses
Prion molecular biology
Prions and disease
Reoviruses
Resistance mechanisms to plant viruses
Retroviruses
Rhabdoviruses
RNA virus reverse genetics
Rotaviruses
Strategies against immune recognition
Structure & assembly (enveloped viruses)
Structure & assembly (non-enveloped)
Transcription of DNA viruses
Vaccine development/new developments
Vaccine development/strategies
Veterinary virus diseases
Viral bioinformatics
Viral diagnostics
Viral diseases in developing countries: clinical aspects and control
Viral diseases in developing countries: epidemiology and surveillance
Viral glycoproteins
Viral infections of the CNS
Viral nucleic acid encapsidation
Viral proteases
Viral vectors/gene therapy
Viroids & satellite viruses (plant & animal)
Virus entry and membrane fusion
Virus evolution and diversity
Virus movement in plants
Virus receptors
Virus taxonomy
Virus-induced immunosuppression
Virus–host protein interactions

The ICVs have long been recognized as the premier international meetings of virologists, usually attracting between 2500 and 4500 participants from all areas of the discipline. Indeed, they are the only large international cross-disciplinary virology conferences. The XIth ICV is already shaping up to be one of the most memorable and scientifically exciting congresses on record, with considerable interest from virologists worldwide.

IXth International Congress of Bacteriology and Applied Microbiology & IXth International Congress of Mycology 16–20 August 1999

The programmes will reflect the diversity of the microbial world and the vital and vigorous role that bacteria and fungi play among living entities. In a major departure from previous ICBAM Congresses, the program will include a wide range of offered paper symposia to ensure that a wide spectrum of microbiologists will have the opportunity to participate by presenting oral papers. A number of offered paper symposia will also be included in the ICM Congress. Each Congress will continue to have plenary cutting-edge symposia with invited speakers (in the morning for IX-ICBAM; in the afternoon for IX-ICM), but in 1999 will also have a range of concurrent, offered paper symposia. In addition, there will be workshops and round table sessions. Offered paper symposia will have from 8 to 16 speakers chosen from among the submitted abstracts, and those not chosen for oral presentation will be invited to present their paper as a poster. The Plenary Symposia for IX-ICBAM are entitled *Intercellular Signalling in Bacteria*, *Extremophiles*, *Emerging Food-borne Diseases*, *Antibiotic Resistance* and *Microbial Genomes*. The Plenary Symposia for IX-ICM are entitled *Species Concepts in Modern Fungal Taxonomy*, *Biodiversity and Biogeography of Australasian Fungi*, *Fungal Resistance in Medicine*, *Food and Biodeterioration* and *Population Genetics of Fungi*. The programme of both Congresses concludes with a joint plenary symposium on *Microbiology in the Next Millenium*. The offered paper symposia in the ICBAM will include the following:

Escherichia coli infections
Lactic acid bacteria
Hospital cross-infection
Fermentation processes & process control
Th1 and Th2 responses to infection
Evolution and phylogeny of prokaryotes
Vaccine development
Tropical infectious diseases
Helicobacter pathogenesis
Ecophysiology of cyanobacteria
Tuberculosis
Marine ultramicro bacteria
Entry of bacteria into eukaryotic cells
Plant–microbe interactions
Molecular typing of micro-organisms
Microbial stress responses
Cell cycles and biological clocks
New and novel wastewater treatment
Bioremediation
Population biology of bacteria
Oxygen: friend or foe?
Climate change & infectious disease
Polar microbiology
Microbial physiology of food-borne micro-organisms

The invited speaker and offered paper symposia in ICM will include:

Sessions on fungal biodiversity
Basidiomycota: Boletales
Basidiomycota: Sequestrate fungi
Basidiomycota: Ustilaginales & Tilletiales
Ascomycota: Erysiphales
Ascomycota: Eurotiales
Ascomycota: Rhytismatales & Leotiales
Zygomycota: Glomales
Estimating fungal biodiversity
Conserving fungal biodiversity

Sessions on medical mycology
Cryptococcus
Molecular epidemiology of mycotic infections
Diagnostic methods of clinical relevance
New antifungals and drug development
Skin mycology
Candida
Molecular and immunodiagnosis of mycotic infections
Filamentous fungal pathogens

More general symposia
Biodiversity in yeasts
Fungi in indoor environments
Teaching mycologists
Wine microbiology & biotechnology
Food mycology
Mushroom toxins
Mycotoxins
Culture collections (with ICBAM)
Secondary metabolite biosynthesis

TRAVEL GRANTS FOR SGM MEMBERS

1999 IUMS Congresses

Sydney Convention Centre, Australia

THE ROYAL SOCIETY has discontinued its block grant system which has, in the past, earmarked a specific sum for travel to IUMS Congresses. Grants are still available from the Royal Society to attend these meetings but applications are now dealt with individually under the standard conference grants procedure. Applicants should be of at least PhD status and normally resident in the UK. Civil servants, employees of research councils, government-funded bodies and commercial concerns are ***not*** eligible for awards. Closing dates for the scheme are 1 March, 1 June, 1 October and 1 December each year.

Full details of the scheme and application forms are available on the Royal Society web site (www.royalsoc.ac.uk) or from Sandra Goodall at the Royal Society, 6 Carlton House Terrace, London SW1Y 5AG (Tel. 0171 451 2540; Fax 0171 930 2170; Email conference.grants@royalsoc.ac.uk).

SGM has also established its own travel fund aimed, in the first instance, at Society members ineligible for a Royal Society award (e.g. postgraduate students, research assistants). Full details of the scheme will be announced in the November *Quarterly*, but anyone who is eligible for a Royal Society award should apply to them first. Ordinary Members applying to the SGM fund will have to provide evidence that their application to the Royal Society has been unsuccessful. Contact the SGM Grants Office for further information and application forms or see our web site: http://www.socgenmicrobiol.org.uk

GENERAL INFORMATION

For up-to-date information check the web site: http://biology.anu.edu.au/iums/

A LARGE AND DIVERSE industry display is planned to be held during both congress weeks featuring all technologies and industries associated with microbiological science. A number of other scientific events are also being planned during the congresses as well as during the weekend between the two congress weeks.

The administrative arrangements for all three congresses are being made by Tour Hosts. They are responsible for all the accommodation and official travel arrangements in Australia, as well as the social programme.

For registration and accommodation details, contact:
IUMS Secretariat, GPO Box 128, Sydney NSW 2001, Australia
Tel. +61 2 9262 2277; Fax +61 2 9262 3135; Email tourhosts@tourhosts.com.au

Participation in the Sydney IUMS Congresses is the perfect opportunity to explore Australia and the world 'down-under'. Tours are available for participants to visit the Great Barrier Reef and its marine wonderland; the semi-arid Red Centre with Ayers Rock, the world's largest monolith; Kakadu National Park with its wetlands, bird and animal life, and Aboriginal rock paintings; the vineyards of the Hunter Valley, or other parts of Australia; the many miles of pristine beaches and tropical islands; and the spectacular mountains and wilderness areas of Tasmania. If you would rather arrange your own tours or itinerary, Tour Hosts would be delighted to help! This is an opportunity of a lifetime!

Emerging Viruses: Myth and Reality

B.K. Rima

The emergence of new antibiotic-resistant bacterial strains and new viruses makes it clear that infectious agents have retained their ability to cause severe problems for the human population and will continue to do so in the foreseeable future.

The emergence of new viruses and associated diseases is an area of research that has come to the fore in the last two decades. However, it is important to distinguish between the emergence of new diseases because there had been no previous monitoring and the sudden appearance of a virus in a new, hitherto unaffected host. In the former case the emergence is really nothing more than us becoming aware of an existing disease problem, or it reflects infection of naïve populations by a virus enzootic in other populations of the same animal species. The latter case was illustrated by the appearance of viruses causing massive seal mortality in 1988 in the naïve population of seals around our coasts. Similarly, the death of Mediterranean dolphins in 1990 could be attributed to a virus infection in naïve animal populations caused by a virus which was most probably enzootic in a number of whale species. The 'emergence' of these virus diseases probably reflects our increased interest in these species of animals.

The emergence of truly new virus diseases in animals or humans is most often related to a species jump of a given virus into a new host. Very often this appears to be associated with a virulent infection of the new host. Numerous examples can be given, ranging from the most well-known case of the 'jump' of HIV from monkeys, where the virus does not cause apparently severe diseases, to humans, where it does, to the 'jumping' of viruses from rodents to human populations, e.g. Sin Nombre virus, which causes severe respiratory syndromes and death, or Ebola virus. The case of canine distemper virus acquiring virulence and transmissibility in large cats (tigers and lions) provides another example. These examples cause genuinely new diseases in the host. There is a school of thought which suggests that most human virus diseases only emerged after the development of animal husbandry brought us into contact with large animal populations. Ecological changes and changes in human behaviour are suggested to be factors in the emergence of Ebola virus, where increased deforestation and the need to find wood for cooking, etc., may have brought people into contact with new rodent viruses.

Vaccination provides a drastic change in the natural ecology of viruses and this might lead to the emergence of new diseases, as attenuation for one host species may not have the same effect for all. The sudden emergence of canine parvovirus (CPV) as a highly virulent and lethal disease of dogs in 1978 is often quoted as an example of this phenomenon. As domestic dogs represent a well-monitored species, veterinarians were fairly sure that they were dealing with a new canine disease. From the time of recognition of this disease, it has been suggested that the CPV infection was caused by widespread vaccination of cats against feline panleukopenia (FPV) or 'cat flu', a chronic and recurrent infection of cats with a high morbidity. Similarities in nucleotide sequences and restriction fragment analyses of the DNA of the canine virus to the feline vaccines led Tratschin and co-workers in 1982 (JGV **61**, 33–41) to suggest a link between the vaccine and the newly emerged disease. However, in the May 1998 issue of JGV, Truyen and co-workers (**79**, 1153–1158) from Günter Siegl's group at the University of Munich, Germany, cast doubt on the earlier suggestions by analysing the sequences of a large number of canine and feline parvoviruses and establishing their phylogeny. Parvoviruses have been found in a number of mustellids (mink and raccoon) and canine species (dogs and foxes). The mink virus first appeared in the 1940s and is suggested to be derived from the feline virus. CPV may be a natural variant of FPV. Alternatively, tissue culture adaptation and attenuation of the FPV for vaccination purposes may have generated a variant with an extended host range and the ability to be transmitted from dog to dog and cause disease. The suggestion that CPV is a natural variant is not unreasonable, due to the fact that host range seems to be determined by variation in only a small number of amino acid residues in the coat protein. CPV appears to have arisen in Europe in the period 1974–1976 and spread rapidly throughout the world in 1978, even to countries with very strict quarantine controls on dogs (*Adv Virus Res* **38**, 403–450). Unfortunately, very few dog isolates were available from the early years. However, the ability to amplify DNA from paraffin-embedded tissue of the first cases in Germany, stored in the freezers of the Veterinary School, allowed sequencing of the viruses from these early cases and comparison of their sequences with those of FPV vaccines used at the time. This showed the viruses to be related to CPV-2. The original CPV-2 has been replaced worldwide by two CPV-2 clades (2a and 2b) which also cause disease in cats. Although it is still possible that CPV was derived from an unrelated vaccine not included in the study, it is clear that the original CPV cannot be related to the vaccines from which it was originally suggested to be derived. There clearly was a CPV-like clade which probably had a common ancestor in the wild population. The animal in question has been suggested by Truyen and co-workers to be the fox. PCR amplification of parvovirus sequences from the ileum of a free-ranging red fox allowed identification of an intermediate virus with FPV- and CPV-2-like sequences. *In toto* the data show a very close relationship between the mink and feline virus and a distinct canine sub-group.

JGV has published many reports in the past decade on the molecular epidemiology of viruses. It is one of the foremost journals for publication of such material. Although sequencing of virus strains appears a tedious job for those who do it, molecular phylogeny has been amply demonstrated to be able to generate important and interesting insights into the epidemiology, pathology and even treatment of virus diseases.

Professor B.K. Rima, (JGV Editor), Medical Biology Centre, The Queen's University of Belfast, 97 Lisburn Road, Belfast BT9 7BL (Tel. 01232 335858; Fax 01232 236505; Email b.rima@qub.ac.uk).

SGM Journals to Go On-line

SINCE FEBRUARY 1997, *Microbiology* and *Journal of General Virology* have had an electronic presence on the SGM web site. Cover images, tables of contents and header information for each article (everything down to the abstract), with sample full text articles, are being mounted near to or on the day of publication. Likewise, information for the *International Journal of Systematic Bacteriology* has been provided since the Society became the publisher at the beginning of 1998. Visitor statistics show that the three journal home pages attract the most traffic on the SGM site, with hit rates growing by 20% every month.

Following extensive research and preparation, we are now about to provide on-line access to the full text of all articles, incorporating a number of value-added features for readers and authors. The system chosen for the launch is HighWire Press, operated by Stanford University Library in California. This already has electronic versions of some of the most prestigious titles in biological and medical sciences, including *Cell*, *Science*, *Proceedings of the National Academy of Sciences* and *Annual Reviews*; the ten journals published by the American Society for Microbiology are currently being mounted. SGM joins leading UK publishers such as the *British Medical Journal* Publishing Group and Oxford University Press (*EMBO Journal*) in this exciting development.

The objective is to make the articles in the three SGM journals accessible to microbiologists in an environment where they can carry out cross-title searches covering a large range of major journals publishing papers in microbiology. The software developed by HighWire and their technology partner Atypon is particularly advanced, enabling sophisticated development of the electronic product.

While many publishers see the on-line delivery of Acrobat PDF files as the end of the story, we will be supplying not only this file type but also full text HTML files. For the technically minded, the latter will be generated by HighWire from SGML documents provided by SGM. We recognized quite some time ago that this approach would allow most versatility in future-proofing our electronic supply. SGML will be stored as the permanent archive, as it is the universal document structure format from which other formats can be derived. PDF files provide an excellent facsimile of the printed page and print well, but are not ideal for reading on screen and can be slow to download. HTML, as the native language of the Web, enables fast loading of articles and flexibility for optimizing the display on screen in your browser.

From the long list of additional services available from HighWire, we have chosen the most often-requested features, among which are inter-article linking, reference links on to Medline and PubMed, sequence database linking, cross-journal searching and linking, and current awareness alerting. But there is still much detailed and careful work to be done and no doubt there will be further developments as the service becomes established. The aim is to go live in the 'fall', with a free period before access controls are introduced during the 1999 subscription year.

In the mean time you can see the system in action at http://www.highwire.org and keep up-to-date with the latest news on the SGM web site at http://www.socgenmicrobiol.org.uk

Ron Fraser and Duncan McGarva, Marlborough House

The Jargon Box

PDF	Portable Document Format (requires Adobe Acrobat Reader for viewing)
HTML	HyperText Markup Language
SGML	Standard Generalized Markup Language

THE WELLCOME TRUST www.wellcome.ac.uk

MEDICINE IN SOCIETY

The Trust is launching a new programme with two main objectives: sponsoring research into the ethical and social implications of biomedical developments and facilitating public debate. The programme offers funding support to:

- further the aims of the Programme
- support the development of research skills in this area
- make medical science accessible to the general public, particularly young people

For further details about the scheme, please contact Dr John Malin, The Wellcome Trust, 183 Euston Road, London NW1 2BE (Tel. 0171 611 8686; Fax 0171 611 8254; Email mis@wellcome.ac.uk).

MAPPING THE LANDSCAPE

National Biomedical Research Outputs 1988–1995

Using its in-house Research Outputs Database, which collates information on all papers published in biomedical ethical fields, the Wellcome Trust has produced a definitive guide to the UK's research outputs between these years. It compares the UK's outputs with those of other leading scientific nations and assesses the relative strength of the UK in 20 subfields of biomedical research. Four major themes are covered.

- How does UK biomedical research fare on a global scale?
- What is our national output like?
- Who is funding UK biomedical research?
- What impact is our biomedical research having?

A free copy of the publication is available from PRISM, The Wellcome Trust, 210 Euston Road, London NW1 2BE (Tel. 0171 611 8479; Fax 0171 611 8742; Email prism@wellcome ac.uk).

SGM Meeting at University of East Anglia

8–10 September 1998

DON'T MISS THE FOLLOWING EVENTS!

Promega Prize

0930 Wednesday 9 September 1998
Lecture Theatre 3, Lecture Theatre Block

Promega Ltd have generously sponsored two prizes of £200 each for the best oral offered papers presented by young researchers. Five presenters of the best oral or poster papers at earlier SGM meetings in 1998 have been chosen to go forward to the final. Please come along and support your fellow students.

S. Lee (University of Nottingham) *Haem iron acquisition in Streptococcus pneumoniae*

S. McGrath (University of Ulster) *The development of a competitive RT-PCR assay for the detection of Clostridium botulinum toxin gene expression*

S.M. Patterson (University of Newcastle) *Antigen-specific membrane fusion mediated by the haemagglutinin protein in influenza virus: separation of attachment and fusion functions on different molecules*

E. Mathew (University of Oxford) *The extracellular domain of vaccinia virus protein B5R affects plaque phenotype, EEV release and intracellular actin*

A. Scott (The Queen's University of Belfast) *Chicken anaemia virus: molecular basis of biological differences*

To be chaired by P.M. Goodwin (The Wellcome Trust)

The winners from this session will go forward to compete against winning colleagues from other UK learned societies for the title of Promega Young Life Scientist of the Year, with a prize of £2,000.

Wine Reception for Younger Members

1900, Tuesday 8 September 1998
Lecture Theatre 3 then 'The Hive'

Younger members of the Society (postgrads, first postdocs and research assistants) are invited to attend this session. A workshop aimed at helping you to present your work successfully will be followed by a glass or two of wine and a finger buffet. There will also be a display of material of interest to young scientists.

Workshop: *Making the Best of Your Audiovisual Presentations*

Scientific lectures and offered papers can be made or marred by the way that data are presented. How many times have you been unable to read the text in slides or been mystified by what the graphics are trying to put over? Even the colours that are used can be a hindrance to clarity rather than a help.

Geoff Harris and Pat Goodwin of the Wellcome Trust will set you on the road to successful audiovisual presentation. In this interactive session they will show the difference between good and bad slides and overheads, give you some tips on creating audiovisual aids and answer your questions.

Reception

The reception after the workshop will be held in 'The Hive', in the adjacent Students' Union. This is close to the campus pub where you can continue to socialize after the food has all gone.

Please note – entry is free but will be by *ticket only* and restricted to younger SGM members (as defined above). Please tick the appropriate box on the booking form in the enclosed Programme Booklet if you wish to attend.

Careers Conferences 1998

Aimed at final year undergraduate and postgraduate students of life sciences, these one-day conferences comprise a programme of useful lectures on all aspects of relevant careers and further training plus an exhibition by employers of life science graduates and universities offering postgraduate education.

The conferences will take place on Saturdays in November. Likely venues are London, Glasgow and Leicester. Individuals or parties of undergrads/postgrads are welcome to attend, on a first come, first served basis. A small fee is charged which includes lunch and refreshments. Full details and application forms will be sent to life science departments in all universities in the area of each conference and will be available on the SGM web site soon. Enquiries to grants@socgenmicrobiol.org.uk

Organized jointly by the Biochemical Society, the Society for General Microbiology, the British Pharmacological Society and the British Society for Immunology

Advanced Course Microbial Physiology and Fermentation Technology

TU Delft
Delft University of Technology

7–18 December 1998
Delft University of Technology The Netherlands

The Advanced Course aims to familiarize the participants with the integrated interdisciplinary approach necessary in modern biotechnology. Microbiologists and (bio)chemical engineers from universities and industries provide the necessary link between fundamental subjects and technical aspects of large-scale processes through a combination of lectures, exercises and practicals.

This annual course is being organized for the twelfth time and is aimed at industry and university employed postgraduates and postdocs.

Themes: Fundamentals of microbial growth; fermentation technology, energetics of microbial growth, metabolic flux analysis, kinetics and analysis of metabolic networks, mixed substrate utilization, scale-up/scale-down, high cell density fermentation and heterologous protein production.

Course leaders: J.G. Kuenen, J.J. Heijnen and K.Ch.A.M. Luyben (Delft University of Technology)

Guest lecturers: L. Eggeling (Research Centre Jülich, Germany), C.A.M.J.J. van den Hondel (TNO-Nutrition), J. Kamphuis (DSM), J. Nielsen (TU Denmark), S. Power (Genencor, USA), M. Reuss (University Stuttgart, Germany), R.J. Rouwenhorst (Quest Int.), M.J. Teixeira de Mattos (University of Amsterdam), J. Tramper, C.D. de Gooijer and A. Rinzema (Agricultural University of Wageningen) and H. van Urk (Delta Biotechnology Ltd, UK)

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Cells & Cell Surfaces

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Warwick, 5–7 January 1999

A one-day symposium entitled *Microbial–Host Interactions at Mucosal Surfaces* will be held on 6 January 1999. Proposed speakers (with provisional titles) are: T. Hirst (Bristol), *V. cholerae* and cell permeability; M. Donnenberg (Baltimore), EPEC and signalling; V. Fischetti (New York), Streptococci and epithelial cells; D. Taylor-Robinson (London), Genitourinary infection; M. Kilian (Aarhus), Microbial IgA1 proteases; C. Kelly (London), Immune responses to oral bacterial antigens; M. Virji (Bristol), Meningococcal adhesion and invasion. There will be slots for offered oral papers, and poster papers relevant to the symposium are particularly encouraged. Titles and abstracts of offered papers are due **by 1 October 1998**. Enquiries may be made to the symposium organizers H.F. Jenkinson or I. Sutcliffe (iain.sutcliffe@sunderland.ac.uk).

Edinburgh, 13–16 April 1999

A one-day symposium entitled *Stress Response* is being organized by T. Carr and M. J. Woodward to consider a variety of both eukaryotic (mainly yeast) and bacterial stress response mechanisms.

Leeds, 7–9 September 1999

A one-day symposium on *Adhesive Structures* is planned to cover a diverse range of adhesion-related cell-surface macromolecular products elaborated by micro-organisms.

Warwick, 9–13 April 2000

A symposium on *Proteases, Proteolysis and Control* is being developed in conjunction with the PB&MG Group. The C&CS Group contact for enquiries or suggestions about this meeting is Vassilis Koronakis (vk103@mole.bio.cam.ac.uk).

Environmental Microbiology

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East Anglia, 8–10 September 1998

Details of the Group's one-day symposium on *Biosensors* have now been finalized and can be found in the accompanying Programme Booklet. If any additional information is required about this meeting, please contact Mark Bailey at (mbj@mail.nerc-oxford.ac.uk). Post-graduate students and young scientists are particularly encouraged to offer papers and posters.

Warwick, 5–7 January 1999

The programme for the main symposium on *Behaviour of Pathogens in the Environment* is now complete. The Group organizer is Keith Jones (Lancaster University) who will be chairing the symposium and speaking on animal and bird vectors. The other speakers and topics include: J. Rogers (CAMR), The role of biofilms in the protection and survival of pathogens; M. Bonten (Chicago), Colonization of patients and environment with vancomycin-resistant enterococci; E. Anaissie (Little Rock), Growth of *Aspergillus* in water in hospital environments; C. Fricker (Thames Water), Growth and survival of pathogens during water treatment; A. Chapman (Sheffield), Survival of *Escherichia coli* O157 in the farm and abattoir; C. Rees (Nottingham), Survival of *Listeria monocytogenes* in soil, water and in association with plants; and J. Isaac-Renton (Canada), Survival of *Cryptosporidium* and *Giardia* in water catchments.

Edinburgh, 13–16 April 1999

This will be a two-day meeting with the S&E Group on *The Detection of Bacteria in Natural Environments*. The programme is nearing completion and will include: The use of molecular methods in microbial ecology; Tracking bacteria using labelled oligonucleotide probes; Use of denaturing gradient gel electrophoresis to study microbial communities; Molecular detection of methanogens and analysis of marine communities using 16S rRNA probes. If you wish to contribute any ideas to the programme please contact either Chris Clegg (cclegg@scri.sari.ac.uk) or Grant Burgess (J.G.Burgess@hw.ac.uk). Further details will appear in the next issue of the *Quarterly*.

Leeds, 7–9 September 1999

A joint meeting with the Geology Society Marine Studies Group is planned for this meeting. There will be a mixture of invited and offered papers, covering microbiology, geology and geochemistry. Some of the topics to be discussed include: Bacteria at depth in marine sediments; Bacteria under pressure; Slime communities; Geochemical evidence for deep bacterial activity; Bacterial mineral

weathering and Biogeochemical alteration of hydrothermal minerals. This meeting is being organized by Rachel Mills, Southampton Oceanographic Centre and John Parkes, Bristol University, from whom further details may be obtained. Anyone wishing to offer a paper at this exciting meeting should contact John Parkes in the first instance (J.Parkes@bristol.ac.uk).

Clinical Virology

Convener:
Dr Philip P. Mortimer
PHLS Virus Reference Division
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61 Colindale Avenue
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Tel. 0181 200 4400
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Warwick, 5–7 January 1999

Following our very well attended and successful symposium on *Viruses and Neurological Disease* at Nottingham, the issue of prescribing antiviral therapy was debated. The debates have established themselves as a useful interactive part of the meetings of the Group, and so at Warwick there will be another debate, on the screening of antenatal patients for HIV infection. The Group symposium will be a joint one on *Respiratory Infections*, and there will be a day of offered papers. Please send titles and abstracts of offered papers without delay to Dr Elizabeth Boxall, Birmingham Public Health Laboratory, Birmingham Heartlands Hospital, B9 5SS. The closing date is **1 October 1998**.

Edinburgh, 13–16 April 1999

The Group meets on 15 and 16 April. The symposium is being organized by Hugh O'Neill and Mary Ogilvie and will be on *Antivirals*.

University of Surrey, Guildford, 5–7 January 2000

The Group will combine with the Virus Group at this meeting.

Warwick, 9–13 April 2000

For the millennial meeting of the Society, David Brown will organize a Group symposium on *Molecular Epidemiology*.

September 2000

In a consortium with the SGM Virus Group and European Virology Societies, the Group will participate in *Virology 2000*, a congress in Glasgow organized by Dr Bill Carman.

This schedule of meetings, all central to the development of better practice in clinical virology, deserves members' fullest support, however pressing calls may have become on clinical workers' time. Therefore, please make every effort to keep the times of these SGM meetings clear in your diary. Please offer papers describing your own research and give the Group your fullest support.

Education

Convener:
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Edinburgh, 13–16 April 1999

Liz Sockett (Nottingham) is organizing a symposium on *Novel Microbiology•Teaching & Learning Outside the Laboratory*. We will be including novel examples of classroom teaching, tutorials and non-standard projects which make microbiology students think and learn. CAL is welcome, but is not the main focus of the symposium. **We need speakers!** What novel things are you doing with your lectures, projects or tutorials? How do you assess such novel learning? Don't be shy, share your ideas! Contact Dr Liz Sockett (Tel. 0115 9513234; Email Liz.Sockett@nottingham.ac.uk or PLZRES@pln1.life.nottingham.ac.uk) **before 1 September 1998**.

Leeds, 7–9 September 1999

Helen O'Sullivan (Liverpool Hope) will be organizing a general event on *Microbiology for Non-microbiologists*! Perhaps not the first thing you'd think of at the SGM, but it is surprising how many scientists of all kinds make use of microbiology without knowing a great deal about it (have we heard this before?). If anyone has thoughts or ideas about this which they would like to express, please contact Helen or the Group Convener.

Warwick, 9–13 April 2000

We will be tying in with the Main Symposium on *Fighting Infection in the 21st Century*, and we will be presenting our own perspective on education of the public about infection.

September 2000

Ron Bishop (Ulster) will be organizing a (user-friendly!) symposium on *Developing Mathematical Skills in Microbiologists*. Everything you wanted to know about analysing those data but were afraid to ask.

Fermentation & Bioprocessing

East Anglia, 8–10 September 1998

The Group's symposium at this meeting is entitled *Mycelial Fermentation* and full details can be found in the accompanying Programme Booklet.

Edinburgh, 13–16 April 1999

The Group will be holding a one-and-a-half day meeting entitled *Archaea*, organized by Rod Herbert (Dundee) on behalf of the Group. The invited papers are as follows: N. Raven & R. Sharp (CAMR), Large-scale cultivation of *Archaea*; M. Danson (Bath), Enzyme evolution and thermostability; D. Cowan (UCL), Diversity of *Archaea* – molecular genetics approach; W.D.Grant (Leicester), Halophiles/ alkaliphiles – isolation and physiological adaptations to life at high salt concentrations and high pH; D. Prieur (Roscoff, France), Extremophiles from deep sea thermal vents – isolation, taxonomy and physiology; F. Robb (Baltimore, USA), Whole cells and growth of *Archaea*; P. Schönheit (Keil, Germany), Metabolism in *Archaea*. If you are interested in presenting a poster (postgraduate students are particularly encouraged), please contact the Convener in the first instance.

Future Meetings

The committee is planning a one day meeting on *Cell Lysis in Fermentation and Bioprocessing* to be held at Leeds in September 1999 (organized by Rob Cumming, Teeside). More details will appear in a future issue of the *Quarterly*. The committee would welcome suggestions from any SGM member for topics of symposia within the area of fermentation and bioprocessing. Please contact the Convener or any committee member.

Convener:
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Irish Branch

The Queen's University of Belfast, 2–4 September 1998.

A joint Symposium on *Microbial Neuropathogenesis* is being organized with Virus Group. For details of this, see p. 106. For further information, contact Dr Louise Cosby, School of Biology & Biochemistry, Medical Biology Centre, Queen's University of Belfast 97 Lisburn Rd, Belfast BT9 7BL (Tel. 01232 272127; Fax 01232 236505; Email L.Cosby@qub.ac.uk).

University College, Cork, 7–8 January 1999

Toxigenicity of Food Micro-organisms: Genetics and Mode of Action. For further information and to offer papers, contact Dr Alan Dobson, University College, Cork, Ireland (Tel. +353 21 902743; Fax +353 21 903101; Email a.dobson@ucc.ie).

Royal Irish Academy, Dublin, April 1999

A joint symposium on *Epidemiology in the Spread of Food Pathogens* is being jointly organized with the Royal Irish Academy. For further information, please contact Margaret Critchley, Royal Irish Academy, 19 Dawson Street, Dublin 2, Ireland (Tel. +353 1 6762570 Fax +353 1 6762346, Email m.critchley@ria.ie).

Convener:
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Microbial Infection

For Microbial Infection Group news, see p. 80 of the May issue of the *Quarterly*.

Physiology, Biochemistry & Molecular Genetics

Edinburgh, 13–16 April 1999

The Group will hold a symposium on *Regulation of Complex Processes in Bacteria* at this meeting in honour of Prof. Willie Donachie. Topics will include: the bacterial cell division cycle – Fts proteins and binary fission and chromosome partitioning; making a protein secretory apparatus; making a flagellum; making a sex pilus; intercellular bacterial communication; bacteria in symbiosis; bacterial animal and plant pathogenesis. The organizer is George Salmond (Cambridge).

The Group will be assessing posters for inclusion in the Promega Prize at this meeting. Qualifying candidates please identify which posters are to be assessed by our judging panel when the abstract is submitted to Marlborough House. Posters do not have to be directly relevant to any of the Group's symposia to be included in the assessment.

Leeds, 7–9 September 1999

The Group will hold a symposium on *Molecular Machines: Mobile Protein Complexes in Micro-organisms* at this meeting. Topics to be covered include: the bacterial flagellum; the bacterial flagellar motor;

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kinesin, actin, and microtubule motility in eukaryotic microbes; actin-based motility in bacteria; enzyme complex motility in electron transport systems; DNA recombination machines; and nucleotide polymerases as mobile machines. The organizer is Liz Sockett (Nottingham). Short contributions are solicited, especially if they include videos of microbe movement or movement of microbial subcellular components. There will also be a joint symposium with the MI and S&E Groups and the Pathological Society on *Food-borne Infections and Intoxications*. The PB&MG co-organizer is Simon Foster (Sheffield) and the MI organizer is Ian Poxton (Edinburgh).

Warwick 9–13 April 2000

The group will hold a symposium on *Transcriptional Control Circuits in Fungi* at this meeting. The organizer is Alistair Brown (Aberdeen). The group will hold a joint meeting with C&CS Group on *Proteases, Proteolysis and Control.*

Future Meetings

The Group Committee is always receptive to suggestions for topics for symposia, workshops, etc. within its remit from any SGM member. Please contact the Convener or any member of the Group committee.

DISCUSSION LIST FOR THE PB&MG GROUP

An Email discussion list has been created with the aim of promoting discussion between members of the microbiology research community. The list will be used to announce news relating to the PB&MG Group of the SGM and general society news. Although primarily for members of the SGM, the list will be open to all microbiologists who are interested.

As the list is still in its early days, the number of messages will initially be very low. All members are encouraged to post a message if they have anything worth commenting on within the field of microbial physiology, biochemistry or molecular genetics. If you see an interesting paper, conference or technique then tell your fellow microbiologists about it! For example, I send a weekly message announcing the week's grants to microbiologists from the NSF, which is an interesting insight into who and what research is currently being funded in the USA.

To join the list, send an Email to mailbase@mailbase.ac.uk with the following in the **body** of the text (i.e. not in the subject) join sgm-pbandmg *Your name* (e.g. join sgm-pbandmg Alex Fleming).

When you join you will be sent an Email telling you all the commands you need to use the list, e.g. posting a message and leaving the list. All messages are archived on the WWW and can be found at the discussion list home page at: http://www.mailbase.ac.uk/lists/sgm-pbandmg/

Gavin H. Thomas, Nitrogen Fixation Laboratory, John Innes Centre

Systematics & Evolution

Warwick, 5–7 January 1999

The Group is holding a collaborative symposium with the MI and CV Groups at this meeting on the subject of *Respiratory Pathogens*. We have planned two days of prestigious speakers covering many important areas in relation to respiratory tract infection – colonization, immunology, mechanisms of damage, novel treatments and vaccines – plus a number of talks about important respiratory pathogens (Hantaviruses, evolution of respiratory syncytial and influenza viruses, evolution and population genetics of Group A streptococci, evolutionary implications of the *Mycobacterium tuberculosis* genome sequence, selfish DNA in mycobacteria, pneumococcal evolution, *Chlamydia pneumoniae*). We hope to include a

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number of complementary short oral contributions or posters. Please forward titles and draft abstracts of any proposals for contributions to the Convener as soon as possible, but **before 2 October 1998**. The deadline for finalised abstracts will be **30 November 1998**.

Edinburgh, 13–16 April 1999

The Group is developing an extensive and topical two-day joint programme with the EM Group – *Detection of Microbes in the Natural Environment*. Please contact the S&E Group organizer (Grant Burgess: j.g.burgess@hw.ac.uk) if you have good ideas for topics or speakers. The symposium is planned for 15 and 16 April and detailed information will follow in the next issue of the *Quarterly*.

Leeds, 7–9 September 1999

The Group is planning a large and exciting joint symposium with the MI and PB&MG Groups along with the Pathological Society on *Food-borne Infections and Intoxications*. More information will follow in the next issue of the *Quarterly*.

Future Meetings

The Group is already planning symposia into 2000 and hopes to hold a joint Group symposium with the CV Group on *Molecular Epidemiology* during the Spring 2000 Society meeting. However, we are always happy to accept ideas from members so do please send any ideas for symposia, workshops or relevant activities to the Convener over the next few months, or contact any committee member and we will discuss your ideas at our next committee meeting.

Virus

The Queen's University of Belfast, 2–4 September 1998.

This will be a joint meeting with the Irish Branch entitled *Microbial Pathogenesis*. Details can be found on p. 106.

Edinburgh, 13–16 April 1999

Microbial Evasion of the Immune Response. The Virus Group will be holding a three-and-a-half-day symposium together with the MI Group. Virus Group activities will start with two workshops on the evening of Monday 12 April. There will also be two workshops on Tuesday evening. Details of the workshop topics and organizers will be announced in the next issue of the *Quarterly*. On Tuesday morning there will be an open paper session for those papers not directly related to the main symposium. The joint symposium will start on Tuesday afternoon and continue through to Friday tea time. In each session there will be three plenary speakers (40 mins) and three open papers (15 mins) on topics related to the plenary session. Speakers to be invited include: B.M. Chain (London), M.A. Kerr (Dundee), P.J. Lachmann (Cambridge), G.L. Smith (Oxford), B. Williams (Cleveland, USA), B. Henderson (London), S. Turco (Kentucky, USA), V.H. Perry (Oxford), P. Murphy (NIH, USA), K.A. McDonough (USA), A. Fosberg (Natl Defence Res. Estab., Sweden), N. Davis-Poynter (Newmarket), G.E. Blair (Leeds), S. Rowland-Jones (Oxford), C.I. Newbold (Oxford), R. Daniels (Mill Hill), N. Saunders (Oxford), A.R.M. Coates (London), D. Thorley-Lawson (USA), D.J. Pickup (Duke, USA), M. Kobt (USA) and H. Acha-Orbea (Lausanne, Switzerland).

Open papers presented at this meeting will be considered for the Promega Prize if the speaker is under 28 years and is either a research student or in their first postdoctoral appointment. Titles and an abstract (150 words max.) should be sent to the Convener **by 20 December 1998**.

University of Surrey, Guildford, 5–7 January 2000

Virus Infection: Life or Death for a Cell. The Virus Group will be holding a three-day symposium at this meeting. In addition there will be open paper sessions and workshops. Details will be announced in future issues of the *Quarterly*.

Convener:
Professor Geoffrey L. Smith
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Topley & Wilson's Microbiology and Microbial Infections Ninth Edition

6 Volume Set and CD-ROM

General Editors
L. Collier, A. Balows & M. Sussman

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Arnold (1997)

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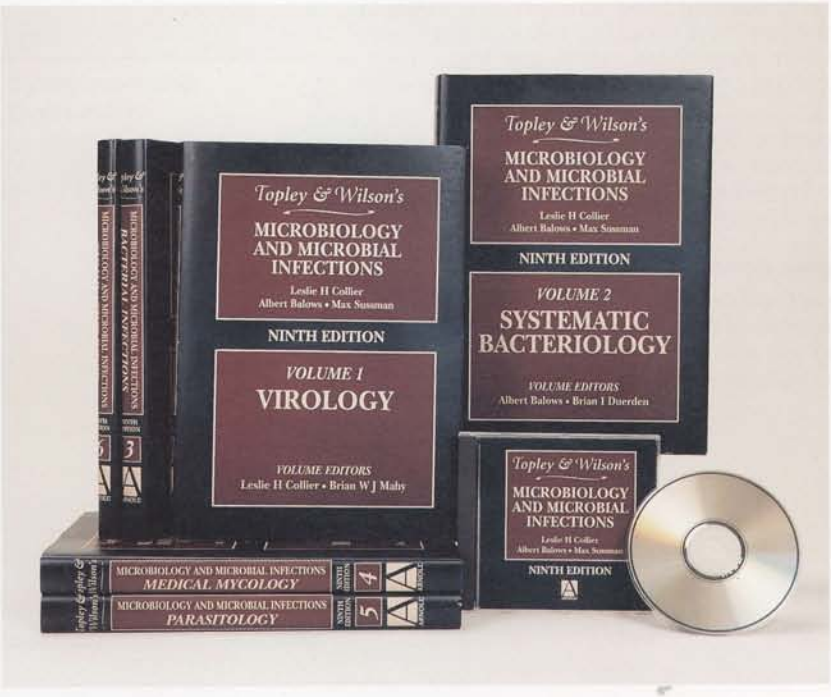
This title may be purchased from Bookpoint Limited, 39 Milton Park, Abingdon, Oxford OX14 4TD (Tel. 01235 400403; Fax 01235 821511).

THERE ARE THREE MAJOR CHANGES to the ninth edition of this classic text compared to previous editions. First, the publishers are to be congratulated on having made the new edition available on CD-ROM. Second, with an eye to the international market, there is a strong international presence among editors and contributors, although the book still retains its traditional base among British microbiologists. Third, the coverage has been widened to include all pathogenic groups of micro-organisms. Inevitably, with such a large, multi-authored reference work, there has been a long gestation period, with information approximately two years behind current research, *circa* 1995. However, some contributors managed to revise their galley proofs to include more recent material. The publisher's intention is to revise the CD-ROM version every year, although it remains to be seen how feasible this will prove. The six printed volumes are beautifully produced, with a clear layout, consistent editorial style and good illustrations, including the occasional colour plate. However we have concentrated on the CD-ROM version which, in its current form, is essentially the printed version published on CD-ROM. As such, this is not a true multimedia resource. It is an electronic text book, with the advantage over ordinary text of easy searching and cross linking. For this purpose a fast CD-ROM drive is highly desirable.

Some of our criticisms of the CD-ROM are due to the software used, the Folio Views infobase system. Searching and linking facilities are extensive, but not always intuitive. The benefit of persevering, however, was shown by the fact that a test search on the word 'chlamydia' (warning: reviewer bias) picked up relevant sections on *Chlamydia* in volume 2 in separate chapters on bacterial diversity, immunoserology and safety, in addition to the expected references in the dedicated chapters on *Chlamydia* and *Chlamydia trachomatis* infections in volumes 2 and 3, respectively. Convenience features include the electronic equivalent of a highlighter pen, 'stick it' notes and bookmarks. Citations in the text are hyperlinked to the complete reference and the reference is linked back to the citation, although where the same reference is quoted several times this does not work. Unfortunately, the text citation fuses the '*et al.*' of multi-authored citations with the name of the first author. There is no provision for easily capturing references into bibliographic reference managing software; you have to cut and paste each part of a reference across. With multi-author publications, names are truncated, so a direct literature search would be more efficient if you wanted to build your own bibliography. It would have been helpful if hyperlinks to references, figures and other sections of the book had been given a different colour, as it's difficult to pick out blue hyperlinks to figures among blue hyperlinks to other text or references. It is a pity that Web links are not provided among the references, as these would have been particularly useful for the CD-ROM version.



Some chapters are presented as a block of text with the figures listed as hyperlinks ('Fig1', 'Fig2' etc.) at the end. There are also some additional colour figures presented as an 'Extra figure' hyperlink which you must click on to read the caption. Having to plough through all of the text and then get to the list of figures was cumbersome. Figures need to be embedded within the text as on the printed page or a Web page.

Copyright regulations obviously mean that you cannot extract information, text or graphics for educational use without permission of the copyright owner. However, a licence for making the CD-ROM available over a network can be purchased. Textual information can be printed although images cannot. Line drawings do not display well on screen; the book versions are far superior, but photographs are of reasonable quality on an 800 × 600 display. Large tables need a screen resolution of 1024 × 768 as they can be difficult to read at lower resolution.

The editors and publishers are to be commended for taking this first crucial step in electronic publishing of a classic text. There is no doubt that the CD-ROM enhances the usefulness of this text. We hope the next version will make more use of multimedia, particularly video; chlamydial elementary bodies dancing within an inclusion are very impressive! In its present form the CD-ROM doesn't justify the slogan printed on the CD: *The only microbiology reference you'll ever need.* We can't imagine any microbiologist who would be taken in by that kind of hype, so why do people bother? Nevertheless, although the Topley & Wilson CD-ROM is no Microsoft *Encarta*, it does have its uses. The six volumes of Topley & Wilson should certainly be in every medical school library.

Trevor Bryant & Michael Ward, University of Southampton.

Book Reviews

Views of the Cell. A Pictorial History

By J.G. Gall.
Published by The American Society for Cell Biology (1996).
US$29.00 (plus postage: US US$5.00/rest of world US$15.00)
pp. 128 *ISBN: 1-57814-001-3*

This is a coffee-table book par excellence and I had to claim Editor's privilege to be able to review it, such was its immediate impact and appeal to all who saw it. It is an eclectic set of images from the history of biology seen through the microscope. Each image, laid out in colour (where appropriate) on a full large-format page, is accompanied by a page of text, explaining the context and significance of the image. This is not really a history of cell biology, but a series of vignettes and an unashamed excuse to publish these superb pictures again, having first been republished as cover images for *Molecular Biology of the Cell*.

This is a book for personal ownership rather than the library shelf and I recommend it to all those with an eye for the beauty of biological form. It will grace any bookshelf.

Dave Roberts, Natural History Museum, London

Yeast Sugar Metabolism: Biochemistry, Genetics, Biotechnology and Applications

Edited by F.K. Zimmermann & K.-D. Entian.
Published by Technomic Publishing Co. Inc. (1997).
US$199.95/SFr300 *pp. 567* *ISBN: 1-56676-466-1*

This is a useful, if expensive book by 29 authors, of whom only four come from outside the EU. Basically it devotes 25 short chapters to each of the enzymes involved in the conversion of glucose to ethanol and CO_2 (including cellular uptake), with other chapters on the fermentation of other sugars and the biotechnology of specialized yeast strains. Each chapter is a well-referenced and reasonably up-to-date summary of present knowledge. It is a valuable source of references and further reading, with good diagrams and tables.

Such information comes at a price, but the convenience and usefulness of this book makes it worth the money. The Editors have done a thorough and comprehensive job. It will be valuable in industrial research laboratories, as well as at postgraduate level in educational institutions.

Peter J. Large, Hull

Environment and the Law – An Introduction for Environmental Scientists and Lawyers

By J.F. McEldowney & S. McEldowney.
Published by Longman (1996).
£22.99 *pp. 327* *ISBN: 0-582-22712-7*

Many of us have paled at the thought of legal jargon, law and regulations. The authors of this book have done an admirable job in making environmental law accessible to a wide audience, allowing many newcomers to understand and appreciate it. The book is laid out in a logical and systematic fashion. Clearly written with the minimum of jargon, it provides a tier-by-tier comprehensive background to the legal systems and environmental regulations of the UK and the EC. In addition to addressing the issues on land, water and air, this book also deals with noise pollution – which is included in the forthcoming 'Integrated Pollution Prevention and Control' policy – and Genetically Modified Organisms (hidden in the chapter on 'Land Use and Waste'). Despite the rudimentary treatment of the science behind these topics, students studying environmentally related subjects will definitely benefit from the background legal knowledge provided by this book.

Diane Purchase, Middlesex University

Biosorbents for Metal Ions

Edited by J. Wase & C. Forster.
Published by Taylor & Francis (1997).
£49.95 *pp. 256* *ISBN: 0-7484-0431-7*

Contrary to the cover notes, this is not the first book on 'Biosorption' while a plethora of reviews and chapters exist. Since the biosorption field has been static for a number of years, this book contains little novelty in the already well-covered themes. Several chapters overlap and most are redolent of other works meaning the content is dated in places, particularly the repeated references to commercial processes which ceased to exist some time ago. While generally well-presented, the standard of some figures and tables is poor and most figures lack detailed legends or statistics. One table contains misleading metal hydroxide pH values while another table of 'typical biosorbents' does not include freely suspended microbial biomass or microbial products! The cover notes are careless and inaccurate: note that seaweeds are algae; 'non-heavy' is meaningless and that 'lanthanide' is the correct spelling of this word. Not recommended.

Geoff Gadd, University of Dundee

Anthrax: Proceedings of the International Workshop, Winchester, England 19–21 September 1995. Salisbury Medical Bulletin

Edited by P.C.B. Turnbull.
Published by Salisbury Medical Society (1996).
£25 (p&p extra) *ISSN: 0306-3038*

Anthrax is often considered a rare disease of historic importance and only of topical relevance with the threat of biological warfare. However, this interesting collection of papers puts anthrax into current context and provides valuable summaries of the incidence of the disease and the international effort to understand and control it. The volume provides balanced coverage of the biology of anthrax with about 17 articles devoted to each of (i) the incidence of the disease, (ii) ecology, detection and taxonomy, and (iii) pathogenesis and the molecular biology of the toxins. Prophylaxis and control comprises a slightly larger portion of the book while the risks and hazards section is less extensive. All the articles are concise summaries providing referenced accounts of current research or minireviews. This slender volume constitutes an excellent overview of the current status of anthrax and anthrax research and will be of value to both researchers and teachers.

Fergus G. Priest, Heriot Watt University, Edinburgh

Current Clinical Topics in Infectious Diseases, Vol. 16

Edited by J.S. Remington & M.N. Swartz.
Published by Blackwell Science (1996).
£61.50 *pp. 336* *ISBN: 0-86542-477-2*

The sixteenth volume of this annual series covers a wide area of infectious diseases, including clinical aspects of bacteriology, mycology, virology parasitology and epidemiology. The chapters are complete stand-alone reviews of the most recent advances in distinct areas of infectious diseases and would be of interest to a wide range of clinicians and researchers in the field of antibiotic resistance and microbiological and pathological aspects of infectious diseases. Although there is no individual theme within the volume, most of the chapters deal with bacterial disease of man, with one chapter on HIV-2 and one on *Aspergillus*. The breadth of coverage is both a strength and weakness of this volume and series. The lack of focus on a particular theme will broaden the readership, but may limit its suitability to institutional rather than personal purchase.

Kingston Mills, National University of Ireland, Maynooth

Book Reviews

Bacterial Toxins: Tools in Cell Biology and Pharmacology. Laboratory Companion

Edited by K. Aktories.
Published by Chapman & Hall (1997).
£45.00 *pp. 308* *ISBN: 3-8261-0080-8*

This book collates information on selected groups of bacterial toxins used as tools in aspects of contemporary research in cell biology and pharmacology. It is clearly aimed at those whose interests lie in dissecting the complex and wonderfully integrated systems which govern the transduction of cell signals, and the dynamic architecture of the cytoskeleton. Biochemically characterized toxins have now become the preferred tools for achieving many of these objectives. There are also contributions on how to permeabilize cells and how the transporting properties of some toxins may yet be exploited in delivering to the cytoplasm molecules which are normally excluded. There are hints as to how some lethal toxins can be modified for therapeutic use; however, this exciting development is under-represented. I liked the pictographic punctuation of the chapter sections, and the inclusion of both general and specific safety measures necessary for handling these materials. Recommended for library or appropriate lab purchase.

John Stephen, University of Birmingham

Aerial Plant Surface Microbiology

Edited by C.E. Morris, P.C. Nicot & C. Nguyen-The.
Published by Plenum Publishing Corporation (1996).
US$95.00 *pp. 307* *ISBN: 0-306-45382-7*

It's a sign of the cynical times we live in, but I was a little turned off by a dedication which extols young researchers to find *inspiration in the beauty and enigma of life* particularly as in this case it is to be found on a leaf surface. This said, I found this book both informative, well-constructed and readable. The text derives from the latest in a conference series which examines all aspects of a complex habitat harbouring plant pathogens and beneficial micro-organisms and is broken down into six parts (Physical and chemical environment, Interactions between micro-organisms and their hosts, Interactions amongst micro-organisms, Agricultural practices/food quality, Modelling, and Future prospects) each made up of a series of stand-alone chapters. The contributors are leaders in their fields and what they have to say is worthwhile, though I would judge that this book is primarily directed towards the specialist.

Gerry Saddler, IMI, Egham

Intestinal Spirochaetes in Domestic Animals and Humans

Edited by D.J. Hampson & T.B. Stanton.
Published by CAB International (1996).
£60.00/US$105.00 *pp. 400* *ISBN: 0-85199-140-8*

The emergence of this first ever substantial edited volume of contributions by an international group of authors devoted to intestinal spirochaetes underlines the great progress made in the past decade. Not only are the classical fields of morphology and ultrastructure, isolation and culture expertly covered (the chapter by Sellwood & Bland on ultrastructure is outstanding), but detailed biochemistry, molecular characterization and gene manipulation all feature in the detailed dissection of these fascinating bacteria. Clinicians in both veterinary and human medicine have been aware for at least the past century of the relevance of spirochaetes to intestinal pathology, but until now progress has been minimal in defining and characterizing these most fastidious and generally recalcitrant pathogens. The book illustrates beautifully how a determined approach using all the methodologies available to modern classical and molecular microbiology can expose the intricacies of the most 'difficult' bacteria to enhance our understanding. Excellent value at £60!

Charles Penn, University of Birmingham

Immunoassay. A Practical Guide

Edited by B. Law.
Published by Taylor & Francis (1996).
£49.95 *pp. 222* *ISBN 0-7484-0560-7*

This book arose from the perceived need for a practical text on immunoassay development which would deal with all aspects from do's and don'ts to what to do when things inevitably go wrong. It is very much about the 'how' of immunoassay. All of the contributors have hands on experience and work in industry. After a short introduction, the topics covered include hazards, safe handling procedures, immunogen preparation and purification, production of reagent antibodies, radioimmunoassay, ELISA, standardization and validation of immunoassays, quality control procedures, problems and troubleshooting. The Editor and his co-authors have succeeded in producing a highly readable book with simple but clear figures and with bench procedures highlighted in boxes. Perhaps the most valuable contribution of the book is its treatment of validation, standardization, quality control and dealing with problems. This book should be on the shelf of any laboratory engaged in immunoassay.

Cyril J. Smyth, Trinity College, Dublin

Antibacterial Peptide Protocols. Methods in Molecular Biology, Vol. 78

Edited by W.M Shafer.
Published by Humana Press (1997).
US$74.50 *pp. 272* *ISBN: 0-89603-408-9*

Some travellers believe that the difficulties of a voyage become its most pleasurable memories, others doubt this maxim or believe that it operates only in retrospect, and take a guidebook and compass along.

This quotation from one of the chapters nicely sums up the philosophy behind the book, strongly advocating the latter approach. It is very much a hands-on approach. Each chapter contains comprehensive protocols taken from papers and theses and concludes with a final list of notes (tips, hints and explanations) which are vital and enjoyable reading. The NMR chapter gives an excellent background for microbiologists. I would like to have seen similar information on the application of mass spectrophotometry, especially since brief chapters on circular dichroism and analytical centrifugation have been included. Overall a valuable and timely addition to the laboratory in this rapidly expanding area of research.

Peter Lambert, Aston University, Birmingham

The Microbiological Quality of Water

Edited by D.W. Sutcliffe.
Published by Freshwater Biological Association (1997).
£32.00 *pp. 145* *ISBN: 0-900386-57-6*

This is the third in a series of books dealing with the microbial ecology of water. It comprises invited papers delivered at a conference held in London in late 1995. Whilst part of the book deals with surface water as expected, a considerable proportion covers drinking water distribution systems and will be of interest to those working in the industry. Topics include the significance of heterotrophs, viruses, taste and odours, and, most topically, *Cryptosporidium*. A useful little book that will appeal to a wider audience than may be thought at first glance.

Mike Hurst, Watermark

Book Reviews

Bacterial Cell Culture. Essential Data Series

By A.S. Ball.
Published by John Wiley & Sons Ltd (1997).
£15.99 *pp. 100* *ISBN: 0-471-96973-7*

During 25 years as a bacteriologist, I have been ignorant of the meanings of 'pulvinate' and 'erose', and have never needed to use them. Yet in a book of just 100 pages, little larger than a pocket diary, 3 pages are devoted to the minutiae of such esoteric descriptions of bacterial growth on or in agar media.

This little handbook purports to contain essential practical information for students, familiar with the principles of biology and chemistry who are about to start laboratory work with bacterial cultures. I acknowledge it is an extremely difficult task to pick out those essential practical tips and details of methodology that we never consider will need to be told to learners – we just know them, and never ask where we got them! But, if I were buying such a handbook as a student, at this price, I would prefer to be told, for example about Luria broth and agar, or the critical effect of surface dryness of agar plates in growth of colonies. Neither of these is mentioned.

Charles Penn, University of Birmingham

Molecular Genetics of Photosynthesis. Frontiers in Molecular Biology, Vol. 14

Edited by B. Andersson, A.H. Salter & J. Barber.
Published by IRL at Oxford University Press (1996).
£29.95 *pp. 268* *ISBN: 0-19-963447-5*

This well-produced volume brings together aspects of research from the prokaryote, algal and higher plant fields to provide a valuable introduction for those new to this area of research. Graduate students should benefit enormously from reading a volume of this type to gain a wider perspective of their field; the authoritative and informed reviews give a sound historical perspective as well as looking forward to the important questions remaining to be addressed. Best of all it encourages the reader to think about the evolution of photosynthetic systems and the genetic control mechanisms which exist to regulate their development and function. It will also have a role as a recommended text for high level undergraduate courses on this subject. Overall this volume should prove a valuable addition not only to institutional libraries but also, by virtue of its economical pricing, onto students' bookshelves.

Julie Lloyd, University of Essex

Lectin Methods and Protocols. Methods in Molecular Medicine, Vol. 9

Edited by J.M. Rhodes & J.D. Milton.
Published by Humana Press (1997).
US$89.50 *pp. 650* *ISBN: 0-89603-396-1*

Lectins are proteins that bind to carbohydrates. The functional importance of glycosylation in cell–cell and cell–pathogen interactions, as well as intracellular events, has been recognized recently, leading to the creation of the word glycobiology. The very nature of their binding to carbohydrates makes lectins, once they have been well-characterized, extremely useful tools for examining structural changes in glycosylation and their functional consequences in human diseases. Lectins vary considerably in their degree of specificity; some have broad specificity and are useful adjuncts for the isolation or quantification of soluble glycoproteins, whereas some are specific for a single carbohydrate and are more useful for characterization of carbohydrate structure.

This volume in the *Methods in Molecular Medicine* series describes mainly plant lectins in three broad areas of research: (1) analysis of carbohydrate, (2) isolation and quantification of glycoproteins and (3) reaction with living cells. It is divided into sections dealing with lectin histochemistry and cytochemistry, the use of lectins for structural analysis of oligosaccharide chains and detection of lectins in altered patterns of glycosylation in the circulation. Each chapter is well-presented with clear diagrams, good illustrations and a list of tips and technology which workers in the field will find useful. Although the book has multiple authors, it is well-structured and there are only a few overlaps (e.g. HIV discovered in at least three different chapters). This book will help researchers working in cell biology, pathology and biochemistry since it covers the basics of light microscopy through to many applications in these fields. The book brings together a comprehensive collection of methods for using lectins in biomedical research.

Julia Polak, ICSM Hammersmith Campus

The Invisible World. Early Modern Philosophy and the Invention of the Microscope

By C. Wilson.
Published by Princeton University Press (1995).
US$35.00 *pp. 280* *ISBN: 0-691-03418-4*

The microscope has profoundly modified man's perception of the natural world and nowadays we sometimes forget what a struggle it must have been for our ancestors to build a framework of thought which would accommodate all the new information revealed by the instrument. Books on the early development of the microscope tend to concentrate either on purely scientific or historical aspects, usually with much emphasis on giants such as Antonie van Leeuwenhoek and Robert Hooke, and less information on other microscopists who also exercised a great influence. This book is somewhat unusual in that it examines the interrelationships between the historical, scientific, and philosophical aspects of the development of microscopy. While reading it I was fascinated to realize just how much certain philosophical concepts owe to the microscope. I was also delighted to find frequent mention of investigators whose contributions are sometimes overlooked. If you have an interest in the world of the very small (and as microbiologists I gather that you might!), historical biology and the philosophy of science, you can't go without this very readable book. I strongly recommend it.

Gianfranco Novarino, Natural History Museum, London

Microorganisms & Biotechnology. Advanced Biology Readers

By P. Chenn.
Published by John Murray (Publishers) Ltd (1997).
£10.99 *pp. 176* *ISBN: 0-7195-7509-5*

This book is for A-level Biology students who are taking the popular Biotechnology (and Micro-organisms) optional unit or module of the current syllabuses. Many of the topics within the subject area, such as bioremediation and gene therapy, are not yet covered in standard textbooks because the fields are developing so rapidly. In attempting to fill this niche the book contains detailed information on a wide range of subjects and it will prove useful to A-level students as a reference source. While it is good to see so much applied microbiology, the topic-driven approach has resulted in a rather bitty text, with no attempt to link the applications to the biological principles on which they are based and which make up the core of A-level syllabuses. It is unfortunate that the author is unaware that the SGM teaching pack on microbiology, which is listed among the suggestions for activities at the end of each chapter, has been long out of print.

Janet Hurst, SGM

Book Reviews

Structural Biology of Viruses

Edited by W. Chiu, R.M. Burnett & R.L. Garcea.
Published by Oxford University Press (1997).

£29.50 *pp. 484* *ISBN 0-19-511850-2*

The 39 authors of this book (all but one from the USA) demonstrate the major contribution that cryo-EM, NMR , X-ray crystallography and computer-aided image reconstruction have made to our understanding of viral structure. Data generated from influenza virus, picornaviruses, polyomaviruses, rotavirus, adenovirus, herpesvirus, retroviruses and bacteriophages, up until 1995, are reviewed and related to other molecular studies. One or more chapters addresses each virus and the text is generously illustrated in monochrome. Colour illustrations, however, are hidden in the centre of the book. The introduction discusses viral assembly, including symmetry, but diagrams are absent and few general principles emerge. Methodologies are described in detail so that their cost and complexity become clear. Concluding chapters relate structure to therapy. The merit of this book lies in the elegance of the structural work and the beauty of the resulting models; it will surely be a stimulus and inspiration for all virologists.

David Hockley, NIBSC, South Mimms

The Mycota. A Comprehensive Treatise on Fungi as Experimental Systems for Basic and Applied Research, Vol. IV: Environmental and Microbial Relationships

Edited by K. Esser & P.A. Lemke.
Volume Editors: D.T. Wicklow & B.E. Söderström.
Published by Springer-Verlag GmbH & Co. KG (1997).

SFr 260.00/£122.50/US$235.00
pp. 374 *ISBN: 3-540-58005-0*

This is an indispensable work for all concerned with microbial diversity in relation to ecosystem function. All the chapters are high-quality, wide-ranging, up-to-date reviews by well-chosen experts. *The Mycota* is an on-going comprehensive treatise; this volume brings to it the expertise and insights in fungal ecology which were such a feature of the earlier book by Wicklow & Carroll on *The Fungal Community*, but with more emphasis on applied aspects. The aim of *The Mycota* is to relate fungal systems to basic and applied research and this is splendidly achieved in this volume. The book is exceptionally well-illustrated and produced, with detailed bibliographies. It will not date quickly and is worth its high price. All academic biological libraries should have a copy, and it will be valuable for applied microbial ecologists and those in agriculture, forest science and conservation.

Sarah Watkinson, University of Oxford

Arabidopsis Protocols. Methods in Molecular Biology, Vol. 82

Edited by J.M. Martínez-Zapater & J. Salinas.
Published by Humana Press (1997).

US$79.50 *pp. 472* *ISBN: 0-89603-391-0*

There is no better praise that can be offered for *Arabidopsis Protocols* than a quote from a post-doc who refers to this book as the *What-I-am-doing-today Manual*. Therein lies the beauty of the book, for it is truly a thorough, concise and clearly written manual that can serve as a day-to-day guide for laboratory personnel working with arabidopsis. *Arabidopsis Protocols* provides a comprehensive set of tried-and-tested protocols for arabidopsis work, written by the leading experts in this field. As such, this book should be considered a 'must' for those labs working with not just arabidopsis specifically, but plants in general. Undoubtedly, this book will soon be a well-worn companion on the bookshelves of any labs working with the analysis of plant metabolism, growth and development. This book is a wise purchase for plant science departments, laboratory directors, postdocs and graduate students working in these areas.

Malcolm M. Campbell
Department of Plant Sciences, University of Oxford

Gene Therapy Protocols. Methods in Molecular Medicine

Edited by P.D. Robbins.
Published by Humana Press (1996).

US$110.00 *pp. 448* *ISBN: 0-89603-484-4*

Gene therapy is a very rapidly advancing field. Even if its theory was firmly established some time ago, clinical implementation continues to rely heavily on a constant stream of technological improvements. This explains why books on the 'methods' of gene therapy continue to appear. The reason why they are needed is that, as technology advances, 'how-to-do' books are needed to suit the interests of specialized audiences. Different editors have coped with this vast and rapidly moving field, either by restricting the applications to certain target tissues or by focusing on new improvements in individual vectors. In this book the editor has chosen a balanced approach. There are nine mainly 'methods' chapters (e.g. Adenovirus-conjugates, AAV, Retrovirus, HSV-1, Poliovirus, HPV vectors, and Liposomes), three on gene transfer into the lung, two each for the liver, skin and synovium, five for the hematopoietic system and seven for gene therapy of cancer; the brain, well-covered in other books, is absent. This represents a broad and balanced view of what you can achieve in your tissue of interest using a particular vector. All chapters have materials, methods, notes and generous bibliography sections, which should serve as useful guides for anyone wanting to explore a method further. The inclusion of telephone/fax/Email numbers to contact authors for troubleshooting advice would have been a help for readers trying to implement difficult protocols. The absence of a chapter on lentiviral vectors highlights the speed with which gene therapy runs ahead, rather than any oversight of editor or publisher. In summary, a useful, broad, practically oriented overview of the state-of-the-art on 'how-to-do' gene therapy.

Pedro Lowenstein, University of Manchester

Bacterial Growth 3

By Mike Tait.
Published by Scotcal Software (1997).

Educational prices: Sole licence £99.00 (£29.00 for registered students); Departmental site licence £399.00; Institutional site licence £599.00.
Further information: http://www.demon.co.uk/scotcal/growth3/

This is an excellent and attractive computer simulation of microbial growth experiments. It is a very professional production and as far as I can see scientifically accurate and error-free. It is aimed at and is suitable for first and second year undergraduates studying microbiology. The four types of simulated experiments are entirely appropriate for the target audience. These experiments include total counting, viable counting, preparation of an OD/biomass calibration curve and investigation of the effects of time, temperature and glucose concentration on growth rates. Excellent help, library and tutorial facilities are included. The simulation is well-structured and the lab book facility is very good. The facility for pasting out reports into a Word processor is excellent. This package is good value at £399 for a departmental site licence. I can throughly recommend this software and we will be using it in our first year course during the coming year.

John M. Basford, University of Wales, Cardiff

DIARY

Diary

SGM MEETINGS

Behaviour of Pathogens in the Environment
University of Warwick
5–7 January 1999

Microbial Signalling and Communication
University of Edinburgh
13–16 April 1999

How Do Molecules Cross Microbial Membranes?
University of Leeds
7–9 September 1999

Clinical Virology and Virus Groups:
Virus Infection: Life or Death for a Cell
University of Surrey, Guildford
5–7 January 2000

Fighting Infection in the 21st Century: Successful Strategies and Beyond
University of Warwick
9–13 April 2000

Contact: Meetings Administrator, SGM, Marlborough House, Basingstoke Road, Spencers Wood, Reading RG7 1AE (Tel. 0118 988 1805; Fax 0118 988 5656; Email meetings@socgenmicrobiol.org.uk; Web http://www.socgenmicrobiol.org.uk/meetings.htm)

See pp. 113–117.

SEPTEMBER 1998

Thermophiles '98
Brest, France
6–11 September 1998
Contact: Dr Watrin Laurent, Thermophiles '98, Station Biologique – BP 74, 29682 Roscoff Cedex, France (Fax +33 2 98 29 23 24; Email thermo98@sb-roscoff.fr; http://www.sb-roscoff.fr/Bact/T98/)

3rd International Conference on Anthrax. Organized by the Chemical and Biological Defence Sector, Porton Down, and the Society for Applied Microbiology
University of Plymouth
7–10 September 1998
Contact: The Society for Applied Microbiology, The Blore Tower, The Harpur Centre, Bedford MK40 1TQ (Tel. 01234 326661; Fax 01234 326678; Email sfam@btinternet.com)

Annual meeting of the British Electrophoresis Society: Electrophoresis Methods in the Detection and Treatment of Disease
London, 14–15 September 1998
Contact: Mrs Chris Trand, British Electrophoresis Society, Heart Science Centre, Harefield Hospital, Harefield, Middlesex UB9 6JH (Tel. 01895 828891; Fax 01895 828900; Email chris.trand@harefield.nthames.nhs.uk)

3rd European Biotechnology Symposium
Glasgow, 14–16 September 1998
European Contact: Cheryl Goff/ Sophie Ure, Symposium Secretariat, c/o Meeting Makers Ltd, Crawford Building, Jordanhill Campus, 76 Southbrae Drive, Glasgow G13 1PP (Tel. 0141 553 1930; Fax 0141 552 0511; Email ebs@meetingmakers.co.uk) N. American Contact: Harriet Matysko, BioConferences International Inc. (Tel. +1 914 834 3100; Fax +1 914 834 3689; Email hmatysko@liebertpub.com; http://www.genengnews.com/symposium2.html)

Molecular Probes in Diagnostics: Nucleic Acids and Protein Techniques
University of Hertfordshire, Hatfield, 15 September 1998
Contact: Dr Ralph Rapley, Dept of Biosciences, University of Hertfordshire, College Lane, Hatfield, AL10 9AB (Tel. 01707 285097; Fax 01707 284510; Email r.rapley@herts.ac.uk)

FEMS '98 Supported Meeting. Little Known Organisms of Clinical Importance
Athens, Greece
16–18 September 1998
Contact: Congress Secretariat, 4 Filellinon Street, GR-105 57 Athens, Greece (Tel. +30 1 32 24 368; Fax +30 1 32 45 049)

The Biochemical Society Meeting
University of Leicester
21–23 September 1998
Contact: The Meetings Office, 59 Portland Place, London W1N 3AJ (Tel. 0171 580 3481; Fax 0171 637 7626; Email meetings@biochemsoc.org.uk; http://www.biochemsoc.org.uk)

SEPT.–OCTOBER 1998

Gene Transcription in Yeast: Role of Chromatin and Transcription Factors
Giens, Toulon, France
26 September–1 October 1998
Contact: Head of EURESCO Unit, Dr J. Hendekovic, European Science Foundation, 1 quai Lezay-Marnésia, 67080 Strasbourg Cedex, France (Tel. +33 388 76 71 35; Fax +33 388 36 69 87; Email euresco@esf.org; http://www.esf.org/euresco)

The Australian Society for Microbiology 1998 Annual Scientific Meeting and Exhibition: 'Microbes To The Max'
Wrest Point Hotel Casino Hobart, Tasmania
27 September–2 October 1998
Contact: ASM Secretariat, Unit 23, 20 Commercial Road, Melbourne VIC 3004, Australia (Tel. +61 3 9867 8699; Fax +61 3 9867 8722; Email ASMConference@clari.net.au; http://www.vicnet.net.au/~asm)

OCTOBER 1998

ICRO International Training Course on Current Trends in Microbial Technology for a Sustainable Environment: Exploring Microbial Biodiversity for Novel Processes
Kuala Lumpur, Malaysia
12-24 October 1998
Contact: Dr Horst W. Doelle, MIRCEN-Biotechnology Brisbane, c/o Dept of Microbiology, University of Queensland, St Lucia 4072, Australia (Fax +61 7 38783230), or Dr S. Vikineswary, Institute of Biological Sciences, c/o Institute of Postgraduate Studies and Research, University of Malaya, 50603 Kuala Lumpur, Malaysia (Fax +60 3 7568940)

The Misuse and Abuse of Medicines (*Conf. No. E10-1198*)
London, 19–20 October 1998
Contact: Management Forum Ltd, 48 Woodbridge Road, Guildford, Surrey GU1 4RJ (Tel. 01483 570099; Fax 01483 536424; Email management_forum@psilink.co.uk; http://www.management-forum.co.uk)

Modern Techniques in the Identification of Bacteria and Filamentous Fungi (Course)
IMI, Egham, 19–30 October 1998
Contact: Mrs Stephanie Groundwater, IMI, Bakeham Lane, Egham, Surrey TW20 9TY (Tel. 01784 470111; Fax 01784 470909; Email s.groundwater@cabi.org)

The 1998 Antwerp Meeting on Medical Laboratory Accreditation. Fourth European Conference on Quality [R]evolution in Clinical Laboratories
Antwerp, Belgium
29–30 October 1998
Contact: The 1998 Antwerp Meeting, c/o Timshel Conference Service, Roeselveld 7, B-3020 Herent-Leuven, Belgium (Tel. +32 16/29 00 10; Fax +32 16/29 05 10; Email info@timshel.be)

NOVEMBER 1998

Isolation & Identification of Fungi from Natural Habitats (Course)
IMI, Egham, 26–30 November 1998
Contact: Mrs Stephanie Groundwater, IMI, Bakeham Lane, Egham, Surrey TW20 9TY (Tel. 01784 470111; Fax 01784 470909; Email s.groundwater@cabi.org)

JANUARY 1999

ESACT-UK Annual Meeting 1999
Oxford Brookes University
4–5 January 1999
Contact: Prof. L.A. King, Meetings Secretary ESACT-UK, School of Biological and Molecular Sciences, Oxford Brookes University, Gipsy Lane Campus, Oxford OX3 0BP (Tel. 01865 483240; Fax 01865 483242; Email laking@brookes.ac.uk)

MARCH 1999

Fifth ASM Conference on *Candida* and Candidiasis
The Mills House, Charleston South Carolina, USA
1–4 March 1999
Contact: ASM Meetings Department, 1325 Massachusetts Avenue NW, Washington, DC 20005, USA (Tel. +1 202 942 9248; Fax +1 202 942 9340; Email meetingsInfo@asmusa.org; http://www.asmusa.org)

Industrial Crops. Fourth European Symposium on Industrial Crops and Products, together with Sixth Symposium on Renewable Resources for the Chemical Industry
Bonn, Germany
23–25 March 1999
Contact: Sarah Wilkinson, Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB (Tel. 01865 843691; Fax 01865 843958; Email sm.wilkinson@elsevier.co.uk; http://www.elsevier.nl/locate/icp99)

APRIL 1999

WAM 99 – Wessex Applied Microbiologists Seventh Symposium
Novotel, Southampton
16–18 April 1999
Contact: Jane Pike, 10 Fairlawn Close, Rownhams, Southampton SO16 8DT (Tel. 01703 902619)

JULY 1999

African International Environmental Protection Symposium (AiEPS '99)
Pietermaritzburg, South Africa
4–8 July 1999
Contact: Secretariat, AiEPS '99, Suite 101, Postnet X6, Cascades 3202, South Africa (Email soil&pol@sprs.co.za; http://www.sprs.co.za)

JULY 2000

18th International Congress of Biochemistry and Molecular Biology. Beyond the Genome: Understanding and Exploiting Molecules in the Third Millennium. FEBS
International Convention Centre, Birmingham
16–20 July 2000
Contact: IUBMB 2000, 59 Portland Place, London W1N 3AJ (Tel. 0171 580 5530; Fax 0171 637 7626; Email info@iubmb2000.org)