Microbiologist

The magazine of the Society for Applied Microbiology ■ September 2008 ■ Vol 9 No 3 ISSN 1479-2699

Alternate clinical antimicrobial strategies

INSIDE

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Microbiologist the magazine of the Society for Applied Microbiology

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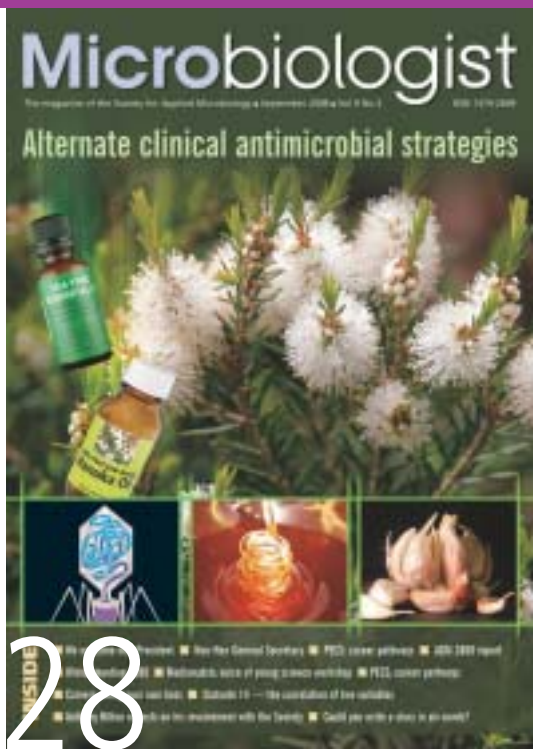

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Editor: Lucy Harper. lucy@sfam.org.uk

Contributions: These are always welcome and should be addressed to the Editor at: lucy@sfam.org.uk

Advertising: Lucy Harper
Tel: +44 (0)1234 326709. email: lucy@sfam.org.uk

Design and print:
Pollard Creativity. micro@pollardcreativity.co.uk

Cover image: *Stephen Pollard*

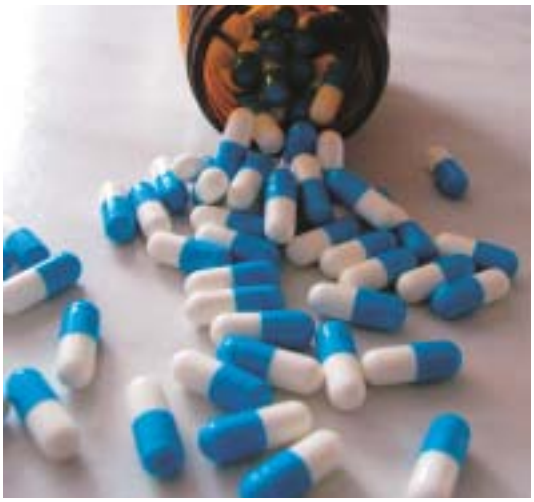
Society for Applied Microbiology,
Bedford Heights, Brickhill Drive, Bedford
MK41 7PH, UK

Tel: +44 (0)1234 326661. Fax: +44 (0)1234 326678

www.sfam.org.uk

editorial

Lucy Harper talks about antibiotic resistance and the changes within the society



The rise in clinically significant antibiotic resistance has been a cause for concern for some time. The over-prescription of broad-spectrum antibiotic drugs has long been considered one cause of this growth. Yet at the time of *Microbiologist* going to press, the Medicines and Healthcare Products Regulatory Agency (MHRA) have approved the reclassification of azithromycin for over-the-counter availability in the treatment of Chlamydia. Having tested positive for infection with this STI, those who are over 16 years will soon be able to obtain 'Chamelle' from pharmacists over the counter. It is hoped this will provide a means to prevent the spread of the most common STI in the UK. However, some may see the benefits of such a reclassification as the subject of debate, considering the issue of antibiotic resistance. What are your views on this potentially contentious subject? If you'd like to share your opinion with the members of S*f*AM then write to the Editor (lucy@sfam.org.uk) who will be glad to receive your thoughts for potential publication in *Microbiologist*.

In this issue, we look at antibiotic resistance by discussing alternative strategies for the treatment of infectious disease. Professor Valerie Edwards-Jones looks at many alternatives to antibiotic treatment, from bacterial interference to the use of herb and plant extracts, from maggots to bacteriophage therapy — (see page 28 for the full article). My feeling is that it will be interesting to monitor the use of such 'alternative therapies' as treatment for infection in the future.

Considering bacteriophage therapy, you may recall back in March 2007, a feature article on this fascinating topic, written by Professor Geoff Hanlon of Brighton University. Well, I am very pleased to announce that Geoff was elected as the new President of S*f*AM at the recent Annual General Meeting (AGM) in Belfast on 9 July 2008 (see page 13 for the minutes of this AGM). In this issue of the magazine Geoff introduces himself and tells us about his research interests his background and his hopes for the future of S*f*AM (see page 8).

There have been a number of changes at the Society since the last issue of *Microbiologist* was published. Not only do we have a new President, but we also have a new Honorary General Secretary. Dr Mark Fielder of Kingston University was elected as the new Honorary General Secretary at the AGM in Belfast. On page 14 we introduce him to you, and on the following page we say farewell to Dr Anthony Hilton of Aston University who retired from this position this year.

If these changes within the society weren't enough, we also welcome a new member of staff, Kate Coggins the Office Administrator (see page 10) — a valuable addition to the Office team!

Finally, I must remind all you budding photographers about the impending deadline for this years' **photography competition**. The deadline is the 26 September so you've not got long to get your entries to the Editor for potential publication in the S*f*AM calendar for 2009 (see page 7 for details). Get snapping!

contribute

We are always looking for enthusiastic writers who wish to contribute articles to the magazine on their chosen microbiological subject.

For further information please email the editor, Lucy Harper at: **lucy@sfam.org.uk**

Lucy Harper

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Advertising:
Information about advertising in *Microbiologist* and how to submit advertise-ments are can be found on the Society website.

Website: our website **(www.sfam.org.uk)** is a timely source of up-to-date information on all Society matters and maintains a comprehensive archive of articles and reports on a variety of microbiological topics.

contact point

Society for Applied Microbiology,
Bedford Heights, Brickhill Drive,
Bedford MK41 7PH, UK

tel: +44 (0)1234 326661
fax: +44 (0)1234 326678
email: communications@sfam.org.uk
www.sfam.org.uk

society office staff

CHIEF EXECUTIVE OFFICER: Philip Wheat
email: pfwheat@sfam.org.uk
tel: +44 (0)1234 326661

COMMUNICATIONS OFFICER: Lucy Harper
email: lucy@sfam.org.uk
tel: +44 (0)1234 326709

MEMBERSHIP CO-ORDINATOR: Julie Wright
email: julie@sfam.org.uk
tel: +44 (0)1234 326846

EVENTS ORGANISER: Sally Cryer
email: sally@sfam.org.uk
tel: +44 (0)1234 761752

OFFICE ADMINISTRATOR: Kate Coggins
email: kate@sfam.org.uk
tel: +44 (0)1234 326846

executive **committee**

COMMITTEE MEMBERS 2006 - 2008

HON PRESIDENT: Professor Geoff Hanlon, School of Pharmacy and Biomolecular Sciences, University of Brighton, Moulsecoomb, Brighton BN2 4GJ
email: g.w.hanlon@brighton.ac.uk

HON GENERAL SECRETARY: Dr Mark Fielder, School of Life Sciences, Kingston University, Penrhyn Road, Kingston upon Thames, Surrey KT1 2EE
email: m.fielder@kingston.ac.uk

HON MEETINGS SECRETARY: Professor Martin Adams, School of Biomedical & Molecular Sciences, University of Surrey,
Guildford,Surrey GU2 7XH
email: m.adams@surrey.ac.uk

HON TREASURER: Professor Valerie Edwards-Jones, Research Development Unit, Manchester Metropolitan University,
Lower Chatham St, Manchester M15 5HA
email: v.e.jones@mmu.ac.uk

HON EDITOR: *Journal of Applied Microbiology*
Professor Arthur Gilmour, Agri-Food and Biosciences Institute, Agricultural, Food and Environmental Science Division, Newforge Lane, Belfast BT9 5PX
email: arthur.gilmour@afbini.gov.uk

HON EDITOR: *Letters in Applied Microbiology*
Dr Jean-Yves Maillard, Welsh School of Pharmacy, Cardiff University, Redwood Building, King Edward VII Avenue Cardiff CF10 3XF
email: maillardj@cardiff.ac.uk

ORDINARY COMMITTEE MEMBERS UNTIL JULY 2009

Professor Carol Phillips, School of Health, The University of Northampton, Boughton Green Road, Northampton NN2 7AL
email: Carol.Phillips@northampton.ac.uk

Mr Mark Reed, Pro-Lab Diagnostics, 7 Westwood Court, Neston
Cheshire CH64 3UJ
email: mreed@pro-lab.com

Professor Joanna Verran, Manchester Metropolitan University, Dept Biological Sciences, Chester Street, Manchester M1 5GD
email: j.verran@mmu.ac.uk

ORDINARY COMMITTEE MEMBERS UNTIL JULY 2010

Mr Steve Davies MA CSci FIBMS, Microbiology Department, Northern General Hospital, Herries Road, Sheffield S7 5AU
email: steve.davies@sth.nhs.uk

Dr Louise Fielding, Food Research and Consultancy Unit, Cardiff School of Health Sciences, University of Wales Institute Cardiff, Llandaff Campus, Western Avenue, Cardiff CF5 2YB
email: lfielding@uwic.ac.uk

Professor Andrew Fox, Health Protection Agency North West, PO Box 209, Clinical Sciences Building, Manchester Royal Infirmary, Manchester M13 9WZ
email:andrew.fox@hpa.org.uk

Dr Andrew McBain, School of Pharmacy & Pharmaceutical Sciences, Stopford Building, University of Manchester, Manchester M13 9PT
email: andrew.mcbain@manchester.ac.uk

ORDINARY COMMITTEE MEMBERS UNTIL JULY 2011

Dr Christine Dodd, Department of Applied Biochemistry and Food Science, Sutton Bonnington campus, University of Nottingham,
Loughborough, Leicestershire LE12 5RD
email: christine.dodd@nottingham.ac.uk

Dr Leon Gorris, Unilever, SEAC Risk Analysis Group, Colworth House, Sharnbrook, Bedfordshire MK44 1LQ
email: leon.gorris@unilever.com

benefits

The Society for Applied Microbiology is the voice of applied microbiology within the UK and was founded in 1931. Society members play a leading role in shaping the future of applied microbiology, and enjoy many benefits, including:

- Access to our four peer-reviewed Journals: *Journal of Applied Microbiology*, *Letters in Applied Microbiology*, *Environmental Microbiology* and *Microbial Biotechnology*
- Free access to the entire collection of digitized back files for *JAM* and *LAM* dating back to 1938
- A topical quarterly magazine, *Microbiologist*
- Substantially reduced rates for attendance at SfAM meetings and conferences
- Networking with worldwide professionals in over 73 countries
- Access to private members area of the SfAM website
- Monthly email bulletins with the latest news from SfAM
- Invitation to the annual Environmental Microbiology Lecture
- Eligibility to nominate a candidate for the new SfAM Communications Award
- Fostering cross disciplinary research
- A 25% discount on the extensive Wiley-Blackwell collection of titles

Detailed information about all these benefits and more can be found on the Society website at: www.sfam.org.uk

GRANTS & AWARDS: Many grants, awards and prizes are available to members including the W H Pierce Memorial Prize and Prizes for Student Oral Presentations and Posters at the Summer Conference. In addition to these substantial awards, the Society has funds to assist members in their careers as microbiologists. These include The President's Fund, Conference Studentships, Sponsored Lectures and the popular Students into Work Scheme.

Full details of all the Society's grants and awards can be found on the website together with PDF downloadable application forms.

JOURNALS: The Society publishes two monthly journals: *Journal of Applied Microbiology* and *Letters in Applied Microbiology*. We also produce this quarterly colour magazine, *Microbiologist*, which contains features, topical news stories and full details of our meetings. The Society is also a partner with Wiley-Blackwell in the monthly journal *Environmental Microbiology* and launched a new online journal in 2008; *Microbial Biotechnology.*

Wiley InterScience® is an online service provided by Wiley-Blackwell that gives Full and Student Members FREE access to the online versions of the Society's four journals: *Journal of Applied Microbiology, Letters in Applied Microbiology, Environmental Microbiology* and *Microbial Biotechnology.* Members can also submit papers directly to our journals via an online submission service. For more information about Wiley InterScience® or online manuscript submission, please visit **http://www3.interscience.wiley.com/cgi-bin/home.**

MEETINGS: We hold three annual meetings. The Winter Meeting is a one-day meeting with parallel sessions on topical subjects. The Spring Meeting is a one-day meeting tailored for personnel in clinical microbiology. The Summer Conference is held every July and comprises a main symposium, a poster session, the AGM and a lively social programme. We also hold joint ventures with other organisations on topics of mutual interest.

WEBSITE: The website is the best source of detailed information on the Society and it's many activities. It has fully interactive membership areas where you can find archive issues of *Microbiologist* and exclusive SfAM documentation and much more.

membership options

■ **Full ordinary membership** gives access to our many grants and awards, online access to the *Journal of Applied Microbiology*, *Letters in Applied Microbiology*, *Environmental Microbiology* and *Microbial Biotechnology* for 2008, copies of *Microbiologist*, preferential registration rates at Society meetings and access to the members areas of the website.

■ **Full student membership** confers the same benefits as Full Membership at a specially reduced rate for full time students not in receipt of a taxable salary.

■ **Associate membership** is only open to those with an interest in applied microbiology without it being a prime aspect of their job. For example, school teachers and those taking a career break; on maternity leave, or working temporarily in other areas. It does not provide access to any journals or Society grants and awards.

■ **Honorary membership** of the Society is by election only and this honour is conferred on persons of distinction in the field of applied microbiology. Honorary members have access to our online journals.

■ **Corporate membership** is open to all companies with an interest in microbiology.
Corporate members benefits include:

- Quarter page advertisement in each issue of *Microbiologist* (which can be upgraded to a larger size at discounted rates)
- the opportunity to publish press releases, company news, etc., in each issue of *Microbiologist*
- FREE banner advert on the Society Website with a direct link to your company site.
- Up to three members of company staff attending Society meetings at members' rate (This means a 50% discount on non member registration rate).

■ **Retirement membership** is available to Full Members once they have retired from their employment. Retired members are entitled to all the benefits of Full Membership except grants and access to the Society's journals.

JOIN US!

You can apply for membership on, or offline. To apply offline, please contact the Membership Co-ordinator, Julie Wright on **+44 (0)1234 326846**, or email **julie@sfam.org.uk.** Alternatively, write to her at:

The Society for Applied Microbiology, Bedford Heights, Brickhill Drive, Bedford MK41 7PH, UK

www.sfam.org.uk

microbreak

could you write a story in just **six** words?

It is said that in the 1920s, Ernest Hemingway bet that he could write a complete story in just six words. He wrote: 'For Sale: baby shoes, never worn.'

He won the bet.

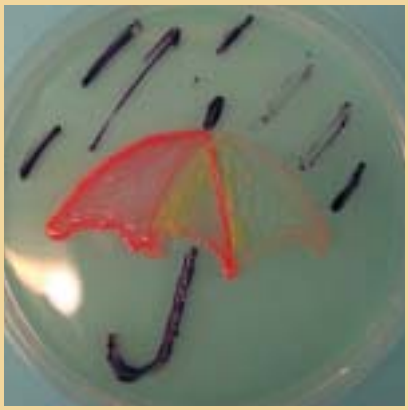
Now we would like to challenge you to do the same, but with a twist. This issues microbreak competition is to write a story in six words but with a microbiological link or theme.

The ten best entries will be posted on the S*f*AM website and the winning entry will win a prize!

So, all you budding writers out there, get thinking and send your entries to the Editor (lucy@sfam.org.uk) **before 10 October 2008**

S*f*AM **Photo Competition**

Have you taken an outstanding photograph of your beloved bugs? Do you know someone who has and you'd like to see their work in print? Perhaps you've taken a photograph while attending a S*f*AM conference which you think is worthy of reproduction?



Due to popular demand, S*f*AM are running the photography competition again this year. We are looking for twelve eye-catching images to use for our 2009 calendar which we will be giving to all our members as a Christmas gift.

To enter this competition, please send your photographs to the Editor in the form of JPEG files which must be a minimum size of 7 x 7cm at 300dpi (800 x 800 pixels). Alternatively, you can send the original photographs in hard copy to the Society Office and we will return them to you once they have been scanned.

Photographs will appear in one of two categories:

1. Scientific — e.g., a colourful image using bacteria
2. Non-scientific but with a S*f*AM theme e.g., taken at a S*f*AM event

The closing date for entries for this competition is Friday 26 September 2008

president's column

Our new president, **Geoff Hanlon** introduces himself

Walking past the building site that sits snugly next to a 1960s block in Brighton, taking the lift up to the sixth floor and passing down a bright corridor containing numerous prints and works of art one could be forgiven for thinking one had entered an arts faculty. That is, if it weren't for the labs that visibly lurk beyond most of the doors. But not behind the door of room 616; this is the office of the newly elected President of SfAM, Professor **Geoff Hanlon**. Here he introduces himself and talks about his aims for the Society.

Born in 1950, Geoff grew up in London in post-war Britain. In London at that time there was precious little in the way of housing as most had been bombed during the war. So the first two or three years of Geoff's life were spent living in a caravan. This was quite common at that time, purely and simply because there were no other houses. But after a couple of years he moved up to Harrow in North London.

Geoff attended the local primary school where he excelled in most subjects but then as he passed the 11 plus he went to Harrow County Grammar School. Although this was a good school with a good reputation Geoff didn't really enjoy his time there — he found the atmosphere quite stifling: *"there was even one occasion where the whole of one year (about 120 boys) was flogged as a punishment for some very trivial offence. I tended to excel at sport and I played a lot of Rugby and Cricket and so on,"* he says.

At this time in his life, Geoff didn't shine academically so from Harrow County Grammar School he went on to study for an HND in Applied Biology in Leicester where there were a couple of tutors who were teaching pharmacology: *"...and it was they who really got me interested in science."*

From this stage on, Geoff realised that science was what he wanted to do and so he applied to study Pharmacy at Brighton. Here he was offered a place on the understanding that he pay for himself for one year and then he would receive a grant to pay for the rest of the course. Being penniless he had no choice but to find employment for a year, during which time he worked as a Medical Representative for a Dutch pharmaceutical company called Duphar Pharmaceuticals: Recalling that time, Geoff tells me: *"It's a cold hard world as a medical rep. Nobody wants to see you and nobody wants to speak to you and you're on your own all the time so it was quite a tough time and I grew up a lot in that year. It hardens you a bit."*

Eventually, he saved up enough money to begin his studies in Brighton where he realised that there's no better motivation for study than being self-funded: *"...not only was I doing a subject which I was really interested in, probably for the first time, but also I had the additional motivation that it was my money that was funding it."*

It was therefore pharmacology and not microbiology that sparked Geoff's interest in Pharmacy. The way the course was structured at that time one began by studying the whole range of the pharmaceutical sciences and then specialising later on in the course into pharmaceutical chemistry, pharmaceutics (the formulation of medicines out of raw chemicals), or pharmacology (the action of drugs on tissues). Geoff's path was a strategic one: *"although I enjoyed pharmacology, there were a lot of people who were doing pharmacology degrees and the one thing that's unique about pharmacy is pharmaceutics, because no-one else does the formulation of medicines. So I figured that if I wanted to do something which would stand out I would specialise in pharmaceutics."*

As is the case for most people, during the course of his study Geoff's objectives changed almost monthly ranging from an aspiration to become a self-employed community pharmacist setting up an empire *"...so I could make loads of money and follow in the lines of Jesse Boot"* to hospital pharmacy and then again to industrial pharmacy.

After graduation Geoff worked in both

hospital and community pharmacy and received a number of job offers from industry which were quite tempting at the time. Fortunately he did well in his degree and graduated with the top mark of the year group, at which point, the head of department asked him if he wanted to study even further and do a PhD. The options available to him in terms of topics for his PhD at this time included microbiology which he thought was interesting: *"and that was really what started the microbiology trail for me."*

This interest has been longstanding and diverse beginning with his PhD where he examined the temporal relationships between the formation of bacterial endospores, antibiotic and protease production. Although this was academically interesting Geoff felt it was rather too esoteric and wanted to get involved in more applied, health related microbiology issues. The involvement of commensal microflora in infections associated with implanted medical devices presented just such a clinical problem. Hence began a body of work studying intrauterine contraceptive devices, urinary catheters, stents, CAPD catheters, intraocular lenses, contact lenses etc. Other studies have included microbial biotransformations; biosensors; the mode of action of biocidal agents and aspects of environmental microbiology. An interesting area which Geoff is now working on is that of bacteriophages and their use against infection by both *Pseudomonas aeruginosa* and MRSA. His work on bacteriophages is ongoing in collaboration with the Eliava Institute in Tbilisi and has generated much publicity through an article which appeared in the March 2007 issue of *Microbiologist* magazine.

When asked about people who have influenced him throughout his career, Geoff replies: *"My PhD supervisor was Norman Hodges, and I actually still work with him — he's two doors along from me here in Brighton, so he's been a good friend and colleague for many years. Denver Russell was my other research supervisor so obviously he had a big influence. More recently, Stephen Denyer was the head of school at Brighton for a number of years and our research interests were very similar — we still do a lot of research together on many collaborative projects. So those three people would have had the most influence on me personally."*

As well as contributing to the S*f*AM committee for many years, Geoff's professional life has included membership of, and involvement with, the Royal Pharmaceutical Society of Great Britain (RPSGB). For around 10yrs Geoff was Secretary of the South East England Region of the RPSGB, where his job involved helping to set up and organise conferences and pharmacy-related meetings. Then he became involved with what is now the Academy of Pharmaceutical Sciences, which advises the Pharmaceutical Society on matters of science, but also is responsible for organising the scientific component of the British Pharmaceutical Conference — the main conference every year. For many years Geoff was the microbiology voice on this committee, so if there was any microbiology issue to be discussed it was Geoff who got involved - pharmacy is a very broad church of disciplines. Looking for a fresh challenge he became involved with S*f*AM where he has been an invaluable voice of pharmacy on a microbiology committee. Things have really switched round for Geoff in that sense. When asked about the future of S*f*AM:

"We're going through some very interesting and exciting times. I first became a member of SfAM in 1989 and in those days it was a bit like a cottage industry — it was run voluntarily by enthusiastic individuals and it depended very much on the enthusiasm of those individuals as to how it worked. And of course in those days the Society was quite a lot smaller with less activity and less income. More recently things have changed in terms of scale of activity and income and the Society needs to be organised on a much more professional footing. This was recognised when Peter Silley was President – he appreciated that we needed to be much more organised in the way things were run. This was then consolidated by Margaret Patterson during her presidency when the CEO Phil Wheat was appointed which I think was one of the best things that's happened in recent years. The Society is now much more organised, more equipped to face economic fluctuations and we now have a more robust office support network and structure. Also, now that we've become incorporated this is going to make a big difference in the way we approach things and the scope of what we can achieve. So there are quite a lot of changes taking place as the Society becomes bigger and I think there are a lot of challenges that that's going to pose. I would like to think that the Society will grow and we will increase our membership particularly as we look overseas and try and increase our international membership. However, I would like us to be able to achieve this without losing the essential element of SfAM — that is our proud boast of being a very friendly Society."

It seems that in Geoff's hands S*f*AM has a great future in store.

Professor Geoff Hanlon will be writing his first column in the next issue

apologia

Due to circumstances beyond our control we regret that we are unable to publish the full farewell to Dr Patterson in this issue

ceo's column

Philip Wheat reports on the latest developments within the Society

To enable the Society to retain its charitable status we must show how we provide public benefit from the activities with which we are involved. Two recent initiatives demonstrate this very well. In partnership with our publisher, Wiley-Blackwell we have been involved in providing the Society's journal content free or at low cost for institutions and readers in developing countries. These initiatives have largely focused on the provision of online content. The journals are available through the following programmes:

HINARI/AGORA/OARE

Since 2001 international public/private partnerships, involving three United Nations (UN) agencies — World Health Organization (WHO), Food and Agriculture Organisation (FAO) and United Nations Environment Programme (UNEP) — major science, technology and medical journal publishers, and Cornell and Yale Universities, have provided access to subject-specific peer reviewed learned journals through three sister programmes:

HINARI (Health InterNetwork Access to Research Initiative), launched in 2002 and led by WHO; AGORA (Access to Global Online Research in Agriculture), launched in 2003 and led by FAO; and OARE (Online Access to Research in the Environment), launched in 2006 under the leadership of UNEP. In addition, the Society journals are also available through the Programme for the Enhancement of Research Information which was launched in 2002 by the International Network for the Advancement of Scientific Publications - an interdisciplinary body of the International Council for Science.

In addition to these initiatives for public benefit in developing countries, the Society is also a principal sponser of a website which is being developed under the auspices of the Biosciences Federation and the Nuffield Curriculum Centre. The aim of this website is to provide a resource for teachers of practical biology including microbiology to pupils aged between 12-17 years. Similar sites are currently available for both physics and chemistry teaching. It is hoped that this site will launch later this month with at least fifty practical lessons online and many more to follow as the site evolves. The Society is involved with this initiative alongside other Learned societies including the Institute of Biology and the Society for General Microbiology.

The Society's Winter meeting (Royal Society, London, 14th January, 2009) programme can be found on page 26. There will be two concurrent sessions: enterobacteriaceae in foods and rapid methods in microbiology. I would strongly recommend that if you wish to attend this meeting, you book early as places are limited and we're sure the meeting will be popular.

Some other dates for your diaries are the 2009 Spring and Summer Society meetings. Details are virtually finalised for these two events. The 3rd Broadening Microbiology Horizons in Biomedical Science Spring meeting will take place once again at Aston University, Birmingham on the 22nd April 2009. The equivalent meeting in 2008 proved to be extremely popular and potential delegates were turned away because it was oversubscribed. This has resulted in the Society hiring a larger lecture room with improved facilities for the 2009 event. A full announcement of this meeting will be available shortly.

Finally, the Society Summer Conference 2009 will take place at Manchester Metropolitan University between 6-9th July. The intriguing title of the meeting is 'Fur, feather and fever — zoonotic challenges of the 21st century.' The meeting will have both national and international speakers and the presentations will be in four sessions: Arthropod-borne zoonoses; Wildlife and companion zoonotic infections; Livestock and food borne zoonoses; Emerging and re-emerging zoonoses.

Once again a full announcement of the meeting arrangements will be available shortly and early booking is strongly recommended.

Philp Wheat
Chief Executive Officer

Kate Coggins joins SfAM

Kate Coggins, our new Office Administrator, introduces herself

I originally come from Montana, USA. Bedford, UK became my new home in 1993, when I moved here to join my husband. We have three children who are now at an age that they can survive without their Mum for a few hours a day.

I really enjoy working at SfAM, using my varied administrative skills, meeting various trustees and other regular subcontractors for the Society. SfAM is a wonderful organisation to work for and I enjoy meeting and learning more about the Society and its Members.

2008 W H Pierce Prize winner: Dr Paul Cotter

Having graduated first in my class while obtaining a 1st Class Honours BSc (Microbiology) degree from University College Cork (UCC) in 1996, I began a PhD at the same institute under the guidance of Prof Colin Hill. My research was focused on stress responses utilized by the food pathogen *Listeria monocytogenes* to enhance its survival in food, contribute to gastric transit and tolerate the phagosomal environment i.e. predominantly acidic environments. The most notable research carried out during this period involved an investigation of a glutamate decarboxylase (GAD) system used by the pathogen to increase its internal pH in such environments, resulting in a six-log increase in survival in the presence of glutamate (such as foods containing monosodium glutamate — MSG).

membership matters

Upon completion of my PhD I changed my focus away from mechanisms employed by Gram positive pathogens to aid their survival, to instead develop antimicrobials that prevent such an occurrence. This research took place within the Cork Bacteriocin Group (CBG), a research group jointly located in UCC and Teagasc (the Irish Agriculture and Food Development Authority), Moorepark, Ireland. In the subsequent years my role with the CBG has evolved from one as a Postdoctoral researcher to my current position as a Principal Investigator involving collaborations with excellent former mentors Prof Colin Hill and Prof Paul Ross. My team (currently funded by SFI, HRB, EI and IRCSET) is focused on the research of antimicrobial peptides or bacteriocins with a particular emphasis on class I bacteriocins. These post-translationally modified peptides are also known as lantibiotics. These peptides exhibit potent antimicrobial activity, target essential precursors within the Gram positive cell wall and frequently possess multiple mechanisms of action. We are interested in the identification of novel lantibiotics using lab-based and *in-silico* screens, understanding the mechanisms via which unusual residues are synthesized, investigating the structure of these peptides, and applying them in both food-related and clinical settings. There has been a recent emphasis on the use of bioengineering (both site-directed and random) to generate derivatives with enhanced activity against pathogenic bacteria (and multi-drug resistant pathogens in particular). This goal has recently been achieved for the first time through the generation of derivatives of the prototypical lantibiotic, nisin, that possess enhanced activity against Group B *Streptococcus*, MRSA and/or *L. monocytogenes*.

Most recently, I have endeavored to combine my expertise to investigate a novel family of bacteriocin-like cytolytic peptides, the prototypical example of which, Streptolysin S, contributes to the virulence of Group A *Streptococcus*. While it has been assumed for the past 70 years that these peptides are produced by streptococci only, it has now become apparent that related peptides are produced by some of the most notorious pathogenic bacteria including *L. monocytogenes*. Our investigation of the contribution of these peptides to virulence is ongoing. In combination, this research has resulted in 36 peer-reviewed publications (including articles in *Nat. Review Microbiology*, *Proc. Natl. Acad. Sci. USA.*, *Microbiol. Mol. Biol. Rev.*, *Biochemistry, Mol. Microbiol.* and *J. Bacteriol*).

These achievements have resulted in my being appointed as a Faculty member of Faculty of 1000 Biology ('Applied Microbiology' section) in 2006 and being awarded the title of ESCMID Research Fellow as well as ESCMID-FEMS Joint Research Fellow in 2007.

Finally, for the past year I have also served as a lecturer in UCC in the area of food microbiology. I would like to thank the research, technical, administrative and academic staff of the Microbiology Dept UCC and Teagasc Moorepark for their great assistance throughout the last number years. I am honoured and humbled by having been awarded the 2008 W H Pierce Prize and would like to express my gratitude to both S*f*AM and the sponsor Oxoid.

Membership Changes

NEW MEMBERS

We would like to warmly welcome the following new members and hope that you will participate fully in the activities of the Society.

Australia

N. Cromar; A. R. Howgrave-Graham

Brazil

R. Kruger

Cuba

C. Vallin

France

M. Egounlety; J-B. Poitelon

Iceland

K. Adalsteinsson

Ireland

J. Carroll

Japan

A. Tazumi

Mexico

D.I. Chan Rodriguez

Nigeria

E.I. Chukwura; A.O. Ekundayo; T.M. Kayode-Isola; C. Nwuche

Philippines

P. Forshage

Scotland

K. Crellin

Switzerland

N.Di Maiuta

Uganda

R. Nabachwa; T.M.Tindyebwa

United Kingdom

T. Abbas; M. Adnan; M. Al-Mashhadani; S. Baidong; S.R. Boddu; J-L. Brettell; R.W. Broadhurst; N.M. Bulmer; P. Connolly; C.J. Cooper; T.J. Craven; A. Crombie; A. Crooks; A.R. Diogo Martins Vaz; F. Dorati; L.E. Drummond; M.S. Ferrie; A. Foddai; L. Fyfe; O. Idowu; N.S. Jakubovics; R. James; E. Komitopoulou; A. Kyriakides; S. Lai; S. Lee; J. Marchesi; J. Nally; C. Okwuonu; M.Pritchard; M.T. Rahman; C. Rye; D. Schirmer; P. Smith; M. Stuczen; I.R. Thompson; N. Wilf; D. Wilkinson; J. Williams; Y.Y. Wong

USA

C. Arias; D. Easterhoff; L. Ellis; K. Gillespie; A. Gong; B-Y. Hong; J. Kleinhenz; T. McNealy; G.V. Nevarez-Moorillon; J. Newman; S. Thitaram; L. Tuhela; A. Valm

CORPORATE

Neogen Europe Ltd, UK

LOSSES

We were saddened to learn of the deaths of the following members of the Society:

Professor Emeritus G.A. Stathopoulos, a Full Ordinary Member since 1994;
Mr G.H. Wagman, a Retired Member since 1972;
Mr H.G. Parker, a Retired Member since 1966

SfAM members awarded in Queen's Birthday Honours list 2008

Professor Brian Duerden, Professor of Medical Microbiology at Cardiff University and Inspector of Microbiology and Infection Control at the Department of Health was awarded a CBE for his services to medicine and charity.

Kaarin Goodburn, Secretary General of the Chilled Food Association (CFA) has been awarded a MBE for her services to the food industry.

SfAM wish to pass on our congratulations to both members of the Society for these excellent achievements.

2008 SfAM AGM

The 77th annual general meeting of the Society for Applied Microbiology was held on Wednesday 9 July at 4.30 pm at the Wellington Park Hotel, Belfast

Present

Anthony Hilton, John V. Lee, Alan Godfree, John Rigarlsford, David Owens, Alan Edmondson, Irene grant, Catherine Ramsay, Christine Holcroft, Peter Green, Sally Cutter, Paul Cotter, Chris Hodgson, Andrew Hall, Bernard Dixon, Louise Fielding, Carol Phillips, Mark Reed, Martin Adams, Mark Fielder.

In the absence of the President and the Vice President under the Memorandum and Articles of Association it states that the trustees approve one Trustee to take on the role of Chair of the AGM. Dr Anthony Hilton, Honorary General Secretary assumed the role of Chair for this meeting

1. Apologies for absence

Apologies for absence were received from Margaret Patterson, Geoff Hanlon, Lamya Diwany, Max Sussman, Fred Skinner, John Lowe, Ian Feavers, Ron Board, Rita Colwell, Colin Dennis.

2. 76th Annual Meeting

The minutes of the 76th Annual Meeting held in Cardiff, 2007 were published in the September 2007 issue of *Microbiologist*. They were approved and accepted by those present. Proposed: Valerie Edwards-Jones; Seconded: Peter Green

3. Matters arising

There were no matters arising

4. Report of the Trustees of the Society 2007

Copies of the report of the Society for 2007 were distributed previously. This report was accepted.

5. Adoption of the Annual Report 2007

Anthony Hilton asked for the report of the trustees to be officially adopted by those present. All present were in agreement. Proposed: John Rigarlsford. Seconded: Andrew Sails

6. Election of new Committee members

Anthony Hilton reported that this year there were two committee vacancies as Andrew Sails and Tony Worthington were retiring by rotation. These members were thanked for their contributions and hard work during their terms of office.

Anthony Hilton then stated that two nominations had been made to committee. The new members of committee for 2008-2011 are:
Christine Dodd — nominated by Arthur Gilmour and seconded by Martin Adams
Leon Gorris — nominated by Martin Adams and seconded by Margaret Patterson.

7. Election of new members (including honorary members), deaths and resignations

Anthony Hilton provided a list of names of applicants for ordinary membership which was tabled. This has been published in the *Microbiologist* throughout the year. Anthony Hilton holds a summary of the deaths and resignations of members through the previous year for consultation if requested.

8. Retirement of Honorary President

and election of new Honorary President

Anthony Hilton thanked Margaret Patterson and put forward Geoff Hanlon *in absentia* as new President of SfAM. He asked for nominations from the floor. No other nominations were forthcoming. Anthony Hilton welcomed Geoff Hanlon *in absentia* as the new President of SfAM.

9. Retirement of Honorary General Secretary

and election of new Honorary General Secretary

Anthony Hilton retired from his role as Honorary General Secretary and put forward Mark Fielder as the new Honorary General Secretary. He asked for nominations from the floor. No other nominations were forthcoming. Anthony Hilton welcomed Mark Fielder as the new Honorary General Secretary.

10. Creation of a company limited by guarantee

(company number 6462427) and registered charity number 1123044)

Philip Wheat reported that as of 30 June 2008 SfAM became a company limited by guarantee as well as a registered charity. This results in a change to the nature of the reporting such that in 2008 there will be two Society reports: one for the period January – June 2008 and a second for the period July – December 2008.

11. Amendments to the Articles of Association

Philip Wheat reported the Articles of Association had been amended as described in the Appendix to the Agenda for this AGM. There were no comments regarding this change.

12. Any other business

There were no additional matters raised.

Hello... Mark Fielder

Dr **Mark Fielder** is our new Honorary General Secretary. Here he introduces himself and talks about his research interests, the people in his life and his aims for the future of the Society

Mark grew up in a little town in East Sussex, and then wended his way Northwards. At the Princess Royal Hospital in Haywards Heath he became a trainee Biomedical Scientist. Next he completed a microbiology degree (in two years!) at Kings College, London and followed that with a PhD in microbiology and immunology, working on bacterial causes of rheumatoid arthritis and ankylosing spondylitis. Following this he won the Tadion Rideal prize for outstanding post-graduate work in molecular science. He then moved on to St Georges Hospital Medical School to work with Professor David Lewis and Professor George Griffin on the use of Cholera toxin and the heat labile toxin of *E. coli* toxins as adjuvants for mucosal vaccines. Following this, he became a lecturer at Kingston University which is where he is currently based as a Reader in Medical Microbiology.

As we sit in the lobby of the Wellington Park hotel, Belfast, at the *Sf*AM summer conference, Mark recalls his early influences, which included watching medical programmes on television nurturing a childhood ambition to become a pathologist. A few years later exploring the different areas of biology covered by a pathologist, Mark realised the area he was most interested in was microbiology. He tells me why it was microbiology in particular that sparked his interest: *"These tiny organisms are deemed lower forms of life in many respects, yet us as 'higher' life forms have just about every component of our being affected by them. If you look back through history, the way we've moved around the world, survived and thrived, organisms have had a major influence on the way we have successfully exploited niches…or not."*

So, with this initial interest in pathology and microbiology, Mark's next move was to become a trainee Medical Laboratory Scientific Officer (MLSO) as it was back then (it's Biomedical Scientist (BMS) now) at Princess Royal Hospital, Haywards Heath, where he got a first hand view of how organisms directly affect patients. Through this work he became very interested in the pathogenicity of organisms: *"I found it fascinating that some organisms on our bodies can be normal flora and apparently relatively harmless. Yet the same organism, given a different niche exploitation in the same body, can actually be quite a serious pathogen."* This is evident by organisms such as *Staphylococcus aureus* and MRSA, and this became one of Mark's current research interests. The other interest he now has is in mycoplasmas. He says: *"I find these organisms particularly interesting because they have no cell wall, they are a very minimal organism that's deemed very 'weak', yet they are able to exploit just about every niche: they are found in plants and insects, we find them in animals, human, even in slurry."*

Mark and his research team of a post-doctoral scientist and nine PhD students in the UK and abroad do a lot of work looking at the metabolism and pathogenicity of both these organisms. The metabolism work with the mycoplasmas has yielded fantastic opportunities to work with groups all over the world. *"Utilising metabolomic profiles allows a better understanding of the organism from a physiological perspective and means it is possible to improve media and culture methods. Currently this organism is quite underreported because people find it difficult to grow as it has very exacting and fastidious requirements. So in understanding its metabolism, we can then improve the way we isolate this organism and therefore understand much more about it."*

Moving on from his current interests, we looked back at the people who have had an influence on his life and work to date. As well as his wife and now his daughter, one of Mark's greatest influences was the late Dr Roger Miles who was based at Kings College, London. Mark recalls how, as well being his tutor, Roger became a close personal friend: *"It's his culture collection and his research ethos that I now use to carry on the work that I'm doing and the work my research group is undertaking. He was a very noble man, someone who was very sensible in his research approach. He*

and Goodbye... Anthony Hilton

took a simplistic approach — he felt that the more complicated you made an experiment, the more complicated the analysis you needed at the end. He showed that simple experiments can often yield much more information than very complex ones and I try to follow that through in the work I do now."

Mark has been a member of S*f*AM for a total of seven years and was elected to the Main Committee in 2006. We talked about the Society and Mark's new role as Honorary General Secretary: *"As everyone knows, I'm following on from Anthony Hilton (see right) who's done a fantastic job and has been a great ambassador for the society. I will be a happy man if I can follow in his footsteps".*

Mark then goes on to say that once he has got to grips with the role, he'd like to give the new President, Professor Geoff Hanlon (see page 12) all the help and support required. He says: *"We are a dynamic Society and a listening society and I would like to carry that on and make sure that we go from strength to strength and continue to grow as a society."*

Finally, after a cup of coffee and a quick look around the Posters and Trade show, I ask him what he'll be doing after this interview: *"I'll be co-chairing the student session here at the SfAM summer conference in Belfast. We have four exciting presentations by young members of the Society which I think is absolutely fantastic and a forum for our PECS group* (Post-graduate and Early-Career Scientists — see page 42 for their regular column). *This group is a very important part of the Society and the student sessions provides a forum for them to demonstrate the great work they're doing towards their PhD's or early post-docs."*

Having read the abstracts I agree with Mark that we're very much looking forward to seeing these guys perform — it's going to be a very interesting afternoon. It's great to see such good science as a preview for the future of applied microbiology.

Lucy Harper
Editor

Now retiring from his post as Honorary General Secretary of S*f*AM for the last four years, Dr **Anthony Hilton** reflects over this and his previous involvement with the Society

Q Just as an introduction could you tell us a little bit about your background?

A I went to university in Wolverhampton where I studied for a BSc in biological sciences, majoring in microbiology. Then I went to the University of Birmingham where I studied for a PhD in molecular microbiology with Professor Charles Penn. From there I had a brief stint doing some post-doctoral work at Birmingham Heartlands Hospitals Clinical Biochemistry laboratory, before returning to Birmingham University as a lecturer in Food Microbiology. After five years I left Birmingham to come to Aston in 2000 where I now worked as a Senior lecturer and Director of Biology and Biomedical Sciences.

Q What made you choose science and in particular microbiology as a career?

A To be honest with you I would be lying if I said that I chose science as a career. Initially I wanted to be a musician as I'm a classically trained viola player. It just so happened that the remaining A-level subjects I

chose to study were science-based even though my passion was music. In fact, I applied to university to read music, I didn't apply to any university to study science. It was only when I had a complete crisis of confidence career-wise that I thought: "what's the second best thing I can do?" and with the A levels I had, it was science. When I went to university I think like most people pre-university, I hadn't had much exposure to microbiology. Because of the obvious Health and Safety implications a lot of colleges and schools can't really immerse you in that discipline very easily. So I went to university quite naïve of microbiology really. It was only having studied microbiology for my degree and having some pretty inspirational lecturers that were very enthusiastic about microbiology, that my enthusiasm for the subject grew at a relatively late stage.

Q You've mentioned inspirational lecturers — were there any particular role models you can tell us about?

A There were three people really: Dave Hill, Ken Kenward and Mark Maybe; the three of them taught microbiology at Wolverhampton University, they were so enthusiastic and such good teachers that I couldn't help but be inspired. In my later studies there was also my PhD supervisor, Professor Charles Penn; you couldn't ask for a better scientific role model.

Q So now that you're well into your career as a scientist, what are your current research interests?

A Currently I'm working with colleagues here at Aston University on MRSA and *Clostridium difficile*. We're particularly interested in the molecular epidemiology of these organisms and trying to get a better idea of how they enter the hospital environment, spread around and potentially move into the community.

Q Returning to your work with S*f*AM — how did you originally become involved with the Society?

A The first S*f*AM meeting I went to was when I was a PhD student and I attended the summer conference in Bradford in 1996. There I won the award for the best student oral presentation, which is ironic as I was presenting that same award at Stormont at the recent conference in Belfast. Anyway, I won the award and everyone was just so welcoming and so pleasant that I felt part of the Society straight away. Then, when I finished my PhD, very quickly I managed to get a few people to nominate me for the Main Committee and I was elected onto the Main Committee at the York Summer conference which was in 1999 I've been involved in various capacities ever since.

Q What's changed at the Society since you started on Committee?

A A lot has changed since I started. In terms of the Society headquarters I've seen it move from the Blore Tower, which was quite a quirky little building really and where we used to hold all our committee meetings, to Bedford Heights which I think is a fabulous resource. In terms of the office structure itself we've seen the appointment of Phil Wheat as CEO which has been a big change and with all the activities we're now undertaking, we need that level of support in the office. We've also seen the appointment of Lucy Harper as Communications Officer. Although the Society has always realised the importance of effective communication, especially to the general public, it wasn't something we pursued as accurately or professionally as we do now.
In terms of the *Microbiologist*, obviously that changed from being a relatively simple newsletter, *SfAM News*, to becoming a fledgling magazine that's now developed into a high quality coffee-table magazine with general interest science articles and I think it's continued to grow which is excellent. The other journals, *LAM* and *JAM* have increased in stature and impact and also the introduction of the new journals, *Environmental Microbiology* and *Microbial Biotechnology* have been a welcome addition to the Societies' scientific publications. As I leave we'll be holding the first of our annual lectures in London. I think overall S*f*AM hasn't stood still and the increase in scope of activity that we've taken on has been very, very impressive.

Q What to you consider to be S*f*AM's greatest achievement?

A In the current economic climate scientists have less money to put into subscriptions for learned societies and at the same time have increasing expectations of the benefits of membership. I think S*f*AM's ability to grow in terms of its membership, not only nationally but internationally is a tribute to the Societys achievements.

Q What single S*f*AM activity that you've been involved in, are you most proud of?

A I think getting *Microbiologist* off the ground in general and specifically within one of the earlier issues the design-a-bug competition. Getting young children to draw pictures of what they thought bacteria were and getting them involved at a young age was great — I think that particular issue of the magazine is the thing I'm most proud of.

Q Will you stay in touch with S*f*AMs activities and where do you see S*f*AM going in the future?

A Yes, I'll continue to sit on the Communications Subcommittee. Also, I intend to attend S*f*AM meetings as a delegate, so I will stay involved both as a contributor to and a beneficiary of S*f*AMs activities. As far as where I see S*f*AM going, I think science communications is where it's at. I think it's very high on the public and political agenda. Grant funding bodies and other charitable institutions are increasingly asking grant holders to justify how their research activities benefit not only the scientific community but the general public as well. I think that S*f*AM is well positioned to embrace that, because applied microbiology very much affects everyone. I can see S*f*AM exploiting the relationship that we have built with various media in recent years and really getting involved in that arena.

Q What's your fondest memory of your time with S*f*AM?

A Honestly, it is hard to say as I've had so many, particularly in the bar! I think if I had to choose one it would be playing the piano in the lobby bar of the Thistle Hotel, Westminster after the President's Dinner. I did say I'd always wanted to be a musician…

Q So now that you've retired as Hon. Gen. Sec. what will you be doing with all your spare time?

A On a personal level I'll be spending more time with my family — I have two young children, Joel aged 2 and Gabriel only 7 months. Professionally I'll be spending more time doing the job that pays my mortgage.

Q And finally: what will you be doing after this interview?

A I'm going to the pub.

SfAM Presents first Science Communication Award

This year SfAM launched it's Communications Award of £1000 which recognises the effective communication of applied microbiology to the general public.

The winner of the award for 2008 was Professor Richard James, a University of Nottingham expert who has made a passionate commitment to improving the provision of safe healthcare in the UK. He is a microbiologist who obtained his PhD at the Middlesex Hospital Medical School in London before postdoctoral studies at Princeton University, USA. After 25 years in the School of Biological Sciences at the University of East Anglia, he moved to The University of Nottingham in 2000 where he became the Head of the School of Molecular Medical Sciences in the Faculty of Medicine and Director of the Centre for Healthcare Associated Infections. He has lectured on the problems of healthcare-associated infections such as *C.difficile* and MRSA for more than 30 years. He is a member of the Medical Research Council College of Experts and is helping NHS colleagues to develop the MRSA screening system that will be introduced in English hospitals by 2009.

His major research interests in the development of fast, economical diagnostic tests for healthcare associated bacterial infections and new antimicrobial agents to combat pathogens such as MRSA have attracted the attention of media from around the globe. A regular contributor to *Panorama* and the *Today Programme*, other notable appearances include *Tonight* with Trevor Macdonald, *BBC Radio 4's Frontiers*, the *Sunday Telegraph* and T*he Guardian.*

Reacting to the news of his award, Professor Richard James said: *"I am particularly pleased that the efforts to communicate my research knowledge to the wider public have been recognised by this award. As scientists who receive public money to support our research it is incumbent on us to seek to inform a wider audience on what we do and why we do it. The escalating media interest in hospital superbugs in the UK has resulted in an increasing demand for expert comment which I have been happy to help provide. It is my impression that the quality and accuracy of science reporting in the UK media has improved considerably. I would like to think that I and many other scientists have played a part in this process."*

He has actively built working relationships with patient support groups including CDiff Support, MRSA Action UK and National Concern for Healthcare Infections to gain an insight into the patient and relative's viewpoint on safe healthcare and has attended the wreath laying memorial ceremony for victims of infections at Westminster Abbey, organised by MRSA Action UK for the last two years.

Director of Communications at the University of Nottingham, Jonathan Ray said: *"This is a thoroughly deserved award for Professor James. He carries not the faintest whiff of the 'celebrity scientist' and yet articulates his argument in plain and accessible English and with calm authority. This has earned the respect and trust of many journalists in the UK. One of his particular strengths is that he is democratic in his media dealings. Whilst Professor James has engaged with politicians, senior leaders in higher education and in the health service, as well as with his peers worldwide, he has also made a substantial and sustained effort to connect with wider society."*

Professor Richard James received his award at the SfAM summer conference dinner at Stormont, Northern Ireland, on Wednesday July 9, where he acted as the after dinner speaker, entertaining and informing delegates about his experiences and the importance of working with the media. He however recounted a cautionary tale involving the recent reports of a specific MRSA strain being found in pigs and in pig farmers in Holland, where a TV interviewer was trying to lead him into an 'Edwina Curry moment.' This he explained related to a TV interview in 1988 when Edwina Curry as Health Minister said *"Most of the egg production in this country, sadly, is now affected with salmonella,"* which resulted in a sharp fall in egg sales and eventually her resignation, and was nothing to do with her more recent revelations about John Major. Professor James went on to report that he had met Edwina Curry at Westminster Abbey recently but their conversation did not wander onto eggs or John Major.

We would like to reiterate our congratulations to Professor James on winning the award.

Lucy Harper
Communications Officer
Editor

"If we want the public to become interested and excited in our science, we have to tell them about it" says **Melissa Friswell**

Voice of Young Science Workshop 2008

our policy on the media

We will:

- always do our best to provide facts, information and explanation.
- if speculation is required, explain the rationale behind that speculation.
- desist from hyping a story—whether it is the journalist or the scientist doing the hyping.

mediawatch

microbiology in the news

If you have any views on science in the media which you think should feature in this column, please send them to the Editor at: **lucy@sfam.org.uk.**

I am sure that I speak for many researchers, when I say that science portrayal in the media really irritates me, whether it is headlines describing 'MRSA Super Virus' or images of 'scientists' playing around with microscopes. I was therefore, very interested when I had the opportunity to participate in a workshop that addressed these issues. As a community, we are all very quick to criticise the media for their representation of science, but realistically, how many of us actually become involved? Thankfully, this is starting to change thanks to organisations like Sense About Science. Sense About Science is a charitable organisation that works with both the science community and the media to promote good science and evidence for the public. The Voice of Young Science programme (VoYS) was set up by Sense about Science to help encourage early career scientists to get involved in public debate. To help do this they run a series of workshops allowing, young researchers to get together and to discuss their views on media portrayal of science, and to talk directly with the media to try to understand their perspective.

On the 6th June, at the Institute of Biology in London, a small group of researchers met for the VoYS media workshop. The workshop is based around several informal discussion sessions which encourage participation and debate. This particular workshop consisted of three sessions, comprising of discussions with researchers, journalists and members of organisations that aim to promote good communication.

During the first session we were introduced to three scientists who had extensive experiences with the media. First up was Dr Steve Keevil, a Consultant Physicist in MRI based at Guys and St Thomas' hospital. Dr Keevil talked candidly about his experiences with the media. His aim was to create awareness about the introduction of the physical agents directive on MRI by the European Union. If implemented, these regulations would significantly hinder new developments in the area and current clinical practice, due to the exposure limits. Dr Keevil, along with other members of the MRI community successfully lobbied the European Parliament, arguing that there was no evidence to suggest these limits should be imposed. Because of his actions, the bill has been postponed until there is sufficient evidence to support it. This is the first time this has been done. Interestingly, Steve's experiences with the media were mainly positive, which I think is fair to say was something of a surprise!

Next, Professor Azra Ghani, a Reader in epidemiology, specialising in mathematical disease modelling at Imperial College, London shared her experiences. She described the first time that she encountered the media 'hype' first hand after work predicting the worst-case scenario of Creutzfeldt-Jakob disease (CJD) cases was published in the Proceedings of the Royal Society in 1998. Professor Ghani described how, although the paper described different scenerios of cases, the media picked up on the case that detailed the most number of cases and turned it into a story of 'scientists predict millions will die.' This example was more in tune with the audiences' perception of the media, how comments and facts are twisted to create powerful headlines that will sell newspapers.

Finally, Dr Robin Lovell-Badge, who is the head of the Division of Developmental Genetics at the MRC National Institute for Medical Research in London described his experiences. He first came to the attention of the media in the 1990's when his research team identified the gene responsible for sex determination. His work was pounced on by the media who saw it as 'Frankenstein science', he has since been a regular in the media! Dr Lovell-Badge was open and up front about his experiences and reflected honestly on comments he had made and experiences he had with the media, providing a balanced argument allowing us to appreciate both sides of the story and providing us with lots to think about.

All three panellists were highly encouraging of young researchers getting involved with science communication either through their research institute or through external sources. Through the group discussions at the end of the session, it became apparent how many of the workshop attendees had some experience of dealing with the media. What also became clear was the fact that very few of these researchers had been provided with media training, which inevitably lead to bad experiences, being mis-quoted and the resulting articles being in-

accurate. Throughout the discussion, the message from the panellists was clear, if you don't like the way that science is represented in the media, get involved and make a difference.

The second session followed the same format as the first, but this time, we came face to face with journalists themselves. We were encouraged to discuss our impressions of the media — both good and bad — before the session so that we had plenty of ammunition. It's fair to say that as a group of scientists, we mostly came up with negative points which we were ready to fire at the panellists. The Panel consisted of Mike Swain, Science and Environment editor of the *Daily Mirror*, Tom Feilden, Science and Environment correspondent *BBC Radio 4* and Lewis Smith, Environment and Science reporter, *The Times*. First to face the audience was Tom Feilden, who boldly declared that the science community had "Never had it so good". Needless to say, this took us back slightly. What became apparent throughout this session was the huge pressure that journalists are under every day. No one wants to mis-represent a story but it is often difficult to find someone who is willing to talk to the media and to explain exactly what their research is about. This is coupled with the tight deadlines and the editing of the article which is often carried out by non-specialist editors.

The main gripe that the audience had, were the catchy headlines which are designed to sell papers but often do not accurately describe the story and are hugely misleading. We were reassured by all the panellists that they often get the blame for this, but it is the sub-editors who come up with the headlines! It is fair to say that the majority of the audience sympathised with the journalists on the panel, and began to find some understanding of situations where errors can genuinely creep into an article without any malice intended. The take home message from the panel of journalists, was very similar to that of the scientists, if you don't want your research to be mis-represented, talk to journalists and help them to understand, leaving less room for ambiguity!

Finally we had the chance to talk to people from Sense about Science and the Science Media Centre, who explained ways of getting involved, and provided tips on dealing with the media. This session put many tools at our disposal and ideas to work with.

The workshop was excellently organised and gave us, the young researchers, the chance to see both sides of the argument, but what remained clear was the message to get involved. But how do we do this? Many young researchers hold the opinion that science communication is very cliquey, and journalists return time and time again to the 'experts' that they know. What became very apparent was that the media would love to have contact with the young researchers of today, to let them defend their own work and to clearly communicate more of the ground-breaking research that is being carried out in the scientific community. There are a number of options open to young researchers who want to become involved, VoYS have an extensive database of early career scientists who are willing to be called upon by the media to act as a representative of their subject area. A slightly more challenging option is to get YOUR research in the media, by writing articles for local press or university publications. Journalists will often pick up on these, plus local press love having local people writing about local news. Overall we were told, be open and honest about your research, but don't forget to think before you speak. Rushing into arguments and debates without thinking, usually leads to mis-representation and embarrassing situations!

The workshop provided an excellent opportunity to meet with other young researchers, to exchange ideas and opinions and to participate in informal discussions and debates. But I think the most valuable lesson that we all learnt, is that if we want the general public to become interested and excited in our science, we have to tell them about it!

Melissa Friswell
Liverpool University

further information

- For further information about getting involved and the workshops see: www.senseaboutscience.org/VoYS
- To find about the Science Media Centre, visit: www.sciencemediacentre.org
- You can apply for one of the SfAM places at the workshop — look out for announcements in future SfAM email bulletins.

MED•VET•NET

Med-Vet-Net Scientists meet in Saint Malo for the 4th Med-Vet-Net Annual Scientific Meeting

The successful fourth Med-Vet-Net Annual Scientific Meeting took place in the French port town of Saint Malo between 11 and 15 June 2008. After nearly four years of joint activities we are clearly seeing the benefits of our collaborative efforts, many of which were presented at this meeting. *"The conference clearly demonstrates how the Network has developed and diversified and as such, is now recognized worldwide as a major player in zoonoses research"* said Med-Vet-Net's Project Manager, Professor John Threlfall.

Over 220 delegates met for four days at the Palais du Grand Large, a magnificent conference venue overlooking the Brittany coastline or 'La Manche' and the impressive medieval old town of Saint Malo. Scientists from all Med-Vet-Net institutes were represented, and many external delegates joined to share knowledge about controlling and preventing zoonotic diseases and develop greater external collaborations worldwide. A number of SfAM members were funded by Med-Vet-Net to attend the meeting: Steve Davies from Sheffield Teaching Hospitals Foundation Trust and Simon Gould from Kingston University. In addition the Med-Vet-Net Communications Unit were involved in the administration and communication aspects of the meeting.

This meeting was locally organized by the Med-Vet-Net partner institute in France, AFSSA — Agence Française de Sécurité Sanitaire des Aliments. Med-Vet-Net gratefully acknowledges the support from Gold sponsor: GeneSytems; Silver sponsor: AES Chemunex; and INSTAND e.V for sponsorship of a European Keynote Speaker.

Diverse presentations

Topics of the four-day meeting included control strategies, identification of new risks, and new methods of detection and response to emerging diseases. Scientific delegates shared information about bacteria such as *Salmonella* and *E. coli*, parasites including *Trichinella* and *Cryptosporidium*, and food-borne viruses. In total there were five keynote lectures, 52 oral presentations, and over 115 posters.

Med-Vet-Net once again attracted a number of high-calibre, international keynote speakers to the conference. Professor Paula Fedorka-Cray (USA) from the United States Department of Agriculture, Agricultural Research Service, Russell Research Center (USDA-ARS-RRC),

described her microarray work, Vet Net and National Antimicrobial Resistance Monitoring System (NARMS). Dr Rob Willems, from the University Medical Center Utrecht, in The Netherlands spoke on 'VRE and MRSA: population genetics of putative zoonotic agents.' Dr Pierre Rollin (USA) from Centres for Disease Control and Prevention, USA, spoke on 'Emerging Infections: tales of recent outbreaks.' Dr Klaus Brehm from the institute of Hygiene and Microbiology, University of Würzburg, Germany discussed parasite host–pathogen interactions. Professor Geoffrey Mead, formerly at the Royal Veterinary College, University of London, UK, spoke on 'The use of probiotics and prebiotics in farm animals for prevention and control of foodborne human disease.'

From Network to Association?

On the Friday afternoon, a panel session covering 'The Future of EU-funded Research' was held. Introduced by Dr André Jestin, Med-Vet-Net Coordinator's Representative and Chaired by Professor John Threlfall, Med-Vet-Net's Project Manager, the session invited four experts to present their view of how a Network of Excellence (and in particular, Med-Vet-Net) could continue to exist beyond its EC funding. The panellists who participated were: Therese Westrell from the European Centre for Disease Prevention and Control (ECDC), Béla Nagy from

med-vet-net

Med-Vet-Net is a European Network of Excellence that aims to improve research on the prevention and control of zoonoses by integrating veterinary, medical and food science research. Comprising 15 European partners and over 300 scientists, Med-Vet-Net will enable these scientists to share and enhance their knowledge and skills, and develop collaborative research projects.

MAIN PHOTO: Over 220 delegates met for four days at the Palais du Grand Large, St Malo

ABOVE TOP: Participants in the panel discussion (left to right): Imre Varadi, John Stringer, Béla Nagy, Therese Westrell, André Jestin and John Threlfall.

ABOVE BOTTOM: Prof. Geoff Mead gave a keynote lecture on prebiotics in farm animals

the Veterinary Medical Research Institute in Budapest (a Med-Vet-Net partner), John Stringer from Berkley Associates in Brussels, and Imre Varadi representing Open Interface Association, a new association formed from a previous EU-funded project. Discussions focused around a possible Med-Vet-Net Association or Society.

Therese Westrell gave a background overview of ECDC and went on to discuss how ECDC could potentially collaborate with such a Med-Vet-Net Association. Béla Nagy highlighted the importance of continued collaboration across Europe and gave the perspective from a smaller institute involved from Eastern Europe. John Stringer presented some of the legal options for forming associations within Europe and finally, Imre Varadi presented his experiences of setting up a new association from an existing EU project, outlining the processes, the infrastructure and the challenges.

Med-Vet-Net continues to work on defining how its members can continue to work as a collaborative group in the future. A 'Sustainability Sub-Committee' has been set up to facilitate these discussions and formulate a plan for a future association or society.

2009 Final Conference: Madrid

The 5th and final Med-Vet-Net Annual Scientific Meeting is planned for 3–6 June 2009 at Euroforum Infantes, San Lorenzo de El Escorial, Madrid, Spain. This is located 45 km north-east of Madrid, reached easily by public transport. The Royal Site of San Lorenzo of El Escorial is a UNESCO World Heritage Site.

Med-Vet-Net's Spanish partners, Complutense University of Madrid (UCM) and the Instituto de Salud Carlos III (ISCIII) will jointly organize this meeting. We hope to have around 250 delegates, with many coming from outside the Med-Vet-Net network. S*f*AM members are most welcome to attend and submit abstracts. We are also now seeking sponsors for this meeting.

For updates on the 2009 meeting in Madrid, Spain please visit the 5th Med-Vet-Net Annual Scientific Meeting website at www.medvetnet.org/mvnconf09.

Teresa Belcher
Communications Director
Med-Vet-Net

information

For more information about Met-Vet-Net, visit:
www.medvetnet.org/
or contact Teresa Belcher on:
+44 (0)1234 271020

BIOSCIENCES FEDERATION

bio **focus**

Richard Dyer talks about the career structure for research bioscientists

The Biosciences Federation is a single authority representing the UK's biological expertise, providing independent opinion to inform public policy and promoting the advancement of the biosciences.
For further information visit:
http://www.bsf.ac.uk/default.htm

I am quite often asked why the Biosciences Federation (BSF) doesn't 'do something' about the career structure for research bioscientists. More often than not the questioner is thinking only about the public sector and especially the career structure for postdocs in universities. I usually answer by asking what exactly the questioner thinks the BSF could do and the response is nearly always rather vague.

Action can only follow an analysis of the problem. In many ways the situation is well understood, but it does require stating. In the public sector, the modern biology that has raised so many expectations is usually conducted by large teams funded by significant amounts of external money. The team may consist of one tenured senior member of the academic staff, perhaps a more junior member of the academic staff and maybe a dozen people on fixed term contracts. In most institutions there will be few, if any, opportunities for the short term staff to join the faculty.

However, they may not all wish to become a university academic. The majority may be postdocs but they will have a range of career aspirations. Some postdocs will have a predominantly technical role. They fill positions that used to be occupied by staff that had completed vocational training, which may have culminated in an HNC, and who became treasured technicians with a tenured post. These positions have largely disappeared and with them stability in essential expertise: sometimes, probably too often, promising areas of research are closed down because a postdoc leaves and his or her critical skills cannot be replaced.

Other postdocs do not aspire to become team leaders. They have seen the pressure that arises when teams are maintained on grants and want a different 'work life balance'. Although they may want nothing more than a 'first lieutenant' role, many in this cohort are truly excellent scientists. When I was in Bristol, there were tenured university posts of Research Associate and Senior Research Associate. These positions also have largely disappeared.

Finally, some postdocs are truly driven by their research and strongly promote their work at meetings and elsewhere. They are conscious of citation metrics and identify the route for a research career. Many of this smaller cohort succeed.

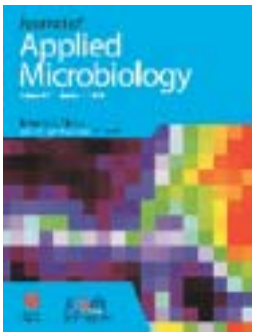
All of this is well known. I write about it briefly not to indicate a yearning for a golden age (which it was not!), but to emphasise that there are different career paths in research for public sector bioscientists and that separate structures are needed for each. But that is only the beginning, honesty is also needed. How many group leaders really state explicitly that a postdoc is in effect a technician? How many think that their responsibility is discharged by finding another postdoc position for someone who would be better off doing something else — perhaps running a pub!? How many are truly delighted when the ambitious, successful postdoc begins to overshadow them? How many suggest that their postdocs should join a contract research organisation and not think about being an international star? How many acknowledge openly that the biosciences cannot continually expand and therefore all postdocs will not get jobs in the area?

So what does 'do something about careers' actually mean? Certainly I believe it is possible to 'do something'. Whilst at the Babraham Institute we created two career paths for postdocs: one for potential team leaders and one for team players. Entry to both paths was very competitive. The potential team leaders were funded by the Institute for two years and had to win a significant grant within this time — preferably a prestigious personal Fellowship. Astonishingly, virtually all were successful. There was no promise of a tenured post but all became very much better equipped to find one. The team players had to have needed generic skills and the ability to refresh them: they also had to be excellent scientists. This very successfully opened a much needed career path for some and provided stability in the essential expertise that the organisation needed. But, of course, this cost money and is not something that many other organisations were/are prepared to do.

Let us focus on the last sentence for a moment. The Babraham Institute was (is) not cash rich. The Babraham Institute decided to reduce the scope of its activities in order to improve the scale. The issue of 'scale and scope' is not systematically addressed in this country. Universities do not have to teach all subjects, or indeed undertake research in any. Some universities do not hesitate to reorganise schools and close subject areas in order to improve the structure and financial strength of the organisation. Perhaps the argument should be made more strongly that human capital is the greatest asset of all and that 'scale and scope' issues apply very strongly to staff at all levels.

So what can the BSF do? Currently we are engaged in working with others on identifying skills shortages — both current and anticipated, both vocational and generic. This work holds promise of important outcomes. But I would be delighted if we could also look at the career question in a potentially constructive way in order to make generic recommendations. Please write to me if you have a view about the constructive way forward.

Richard Dyer
Chief Executive
Biosciences Federation



New 2007 Impact Factor 2.501

The following articles published in 2008 were the most downloaded articles from Journal of Applied Microbiology between April-June 2008:

Novel alternatives to antibiotics: bacteriophages, bacterial cell wall hydrolases, and antimicrobial peptides. A. Parisien, B. Allain, J. Zhang, R. Mandeville, C.Q. Lan. **Vol. 104**, No. 1, January 2008

Bacterial metabolism and health-related effects of galacto-oligosaccharides and other prebiotics. G.T. Macfarlane, H. Steed, S. Macfarlane. **Vol. 104**, No. 2, February 2008

Fungi, quality and safety issues in fresh fruits and vegetables. M.O. Moss. **Vol. 104**, No. 5, May 2008

A risk assessment approach for fresh fruits J. Bassett, P. McClure. **Vol. 104**, No. 4, April 2008

Burkholderia cepacia complex bacteria: opportunistic pathogens with important natural biology. E. Mahenthiralingam, A. Baldwin, C.G. Dowson. **Vol. 104**, No. 6, June 2008

New 2007 Impact Factor 1.623

The following articles published in 2008 were the most downloaded articles from Letters in Applied Microbiology between April-June 2008:

Evaluation of the PCR method for identification of *Bifidobacterium* species. S.Y. Youn, J.M. Seo, G.E. Ji. **Vol. 46**, No. 1, January 2008

New frontiers in probiotic research. R.D. Sleator, C. Hill. **Vol. 46**, No. 2, February 2008

Preliminary characterization of exopolysaccharides produced by a marine biofilm-forming bacterium *Pseudoalteromonas ruthenica* (SBT 033). P. Saravanan, S. Jayachandran. **Vol. 46**, No. 1, January 2008

Rapid detection of H5 avian influenza virus by TaqMan-MGB real-time RT-PCR. Y.Y. Lu, J.Y. Yan, Y. Feng, C.P. Xu, W. Shi, H.Y. Mao. **Vol. 46**, No. 1, January 2008

Fungal endophytes from Dioscorea zingiberensis rhizomes and their antibacterial activity. L. Xu, L. Zhou, J. Zhao, J. Li, X. Li, J. Wang **Vol. 46**, No. 1, January 2008

journal**Watch**

News about the Society's journals

New 2007 Impact Factor 4.929

The following articles published in 2008 were the most downloaded articles from Environmental Microbiology between April-June 2008:

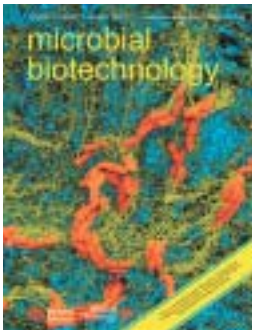
Microbial diversity - insights from population genetics. Ted H. M. Mes. **Vol. 10**, No. 1, January 2008

Social bacteria and asocial eukaryotes. Michael Y. Galperin. **Vol. 10**, No. 2, February 2008

Simultaneous analysis of microbial identity and function using NanoSIMS. Tianlun Li, Ting-Di Wu, Laurent Mazeas, Laurent Toffin, Jean-Luc Guerquin-Kern, Gerard Leblon, Theodore Bouchez. **Vol. 10**, No. 3, March 2008

How to get more out of molecular fingerprints: practical tools for microbial ecology. Massimo Marzorati, Lieven Wittebolle, Nico Boon, Daniele Daffonchio, Willy Verstraete. Online Early

Think big — giant genes in bacteria. Oleg Reva, Burkhard Tummler. **Vol. 10**, No. 3, March 2008.



The third issue of *Microbial Biotechnology* is now freely available to read online. Visit: www.blackwell-synergy.com/loi

Editor's Choice:

Microbial-based motor fuels: science and technology. Lawrence P. Wackett. **Vol 1** Issue 3 Page 211-225, May 2008

Tracing explosives in soil with transcriptional regulators of *Pseudomonas putida* evolved for responding to nitrotoluenes. Junkal Garmendia, Aitor de las Heras, Teca Calcagno Galvão, Víctor de Lorenzo. **Vol 1** Issue 3 Page 236-246, May 2008

PEGylation of bacteriophages increases blood circulation time and reduces T-helper type 1 immune res. Kwang-Pyo Kim, Jeong-Dan Cha, Eun-Hye Jang, Jochen Klumpp, Steven Hagens, Wolf-Dietrich Hardt, Kyung. **Vol 1** Issue 3 Page 247-257, May 2008

Lucy Mansfield
Wiley-Blackwell

Winter meeting 2009

A one day meeting on

enterobacteriaceae in foods and rapid methods in microbiology

Royal Society, Carlton House Terrace, London
Wednesday 14 January 2009

CPD ACCREDITATION
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For the latest programme please visit us online at **www.sfam.org.uk**

including

The Denver Russell Memorial Lecture

Keeping control: studies in preservation

Delivered by **Stephen Denyer**, School of Pharmacy, University of Cardiff

Programme

enterobacteriaceae in foods and rapid methods in microbiology

10.00-10.30 **Tea, coffee and registration**

Chair: **Geoff Hanlon**

10.30-11.15 **The Denver Russell Memorial Lecture**
Keeping control: studies in preservation
Stephen Denyer, School of Pharmacy, University of Cardif, UK

11.15-11.45 **Enterobacteriaceae in foods**
Chris Baylis, CCFRA, Chipping Campden, UK

11.45-12.15 **Impact of rapid screening for meticillin-resistant *Staphylococcus aureus* on hospital infection rates.**
Dr P. J. Jenks. Department of Microbiology and Infection Prevention and Control, Derriford Hospital, Plymouth, UK

12.15-13.15 **Lunch**

Session A. Rapid detection and identification in microbiology.

Chair **Andrew Sails**

13.15-13.45 **Microbial DNA sequence profiling of human pathogens by mass spectrometry.**
Cath Arnold. Health Protection Agency, London, UK

13.45-14.15 **Food and water rapid methods.**
Pradip Patel, Alaska Food Diagnostics Ltd, DSTL, UK.

14.15-14.45 **Rapid detection in Pharmaceutical Microbiology.**
Bob Johnson. (Prev. at PLIVA Pharma Ltd, Petersfield, Hants, UK)

14.45-15.05 **Tea and coffee**

15.05-15.35 **Rapid diagnosis of sepsis.**
Paul Dark, Hope Hospital, Salford, UK

15.35-16.05 **Automation in Clinical Microbiology.**
Martin van der Kaap, Kiestra Laboratory Automation, The Netherlands.

Session B. The enterobacteriaceae in foods

Chair **Martin Adams**

13.15-13.45 **The ecology of enterobacteriaceae in foods**
Mieke Uyttendaele, University of Ghent, Belgium

13.45-14.15 **Epidemiology of foodborne illness caused by Enterobacteriaceae**
Sarah O'Brien, University of Manchester, UK

14.15-14.45 ***Enterobacter sakazakii* and infant feeds**
Stephen Forsythe, Nottingham Trent University, UK

14.45-15.05 **Tea and coffee**

15.05-15.35 **Enterobacteriaceae and hygiene monitoring in frozen foods**
Nick Johnson, Unilever, The Netherlands

15.35-16.05 **Pathogenic enterobacteriaceae in foods.**
Tom Cheasty, HPA, London, UK

16.05 **Meeting closes**

The programme for this meeting was correct at the time of going to press

BOOKING FORM and INVOICE

SfAM WINTER MEETING WEDNESDAY 14 JANUARY 2009

Only ONE person per form please. CLOSING DATE FOR REGISTRATIONS: Wednesday 7 January 2009
EARLY BIRD DISCOUNT of £30.00 is applied to all bookings made before **Friday 19 December 2008**

Cancellation policy: Up to 30 days prior to the event all cancellations will be subject to a 10% cancellation fee, up to 14 days prior to the event there will be a 50% cancellation fee, and no refunds will be given on cancellations made within 7 days of the event.

FEES	Before 19/12/2008	Between 19/12/2008 and 07/01/2009
Full member	£50 ☐	£80 ☐
Student member	£30 ☐	£60 ☐
Honorary member	£30 ☐	£60 ☐
Associate member	£30 ☐	£60 ☐
Retired member	£30 ☐	£60 ☐
Student non member	£60 ☐	£90 ☐
Non member	£100 ☐	£130 ☐
IBMS members	£75 ☐	£105 ☐

YOUR INTERESTS

Please indicate which of the two afternoon parallel sessions you wish to attend

Session A: Rapid detection and identification in microbiology ☐ **Session B:** The enterobacteriaceae in foods ☐

YOUR DETAILS

Title:_____ **First Name:**_____ **Family Name:**_____

Organisation/Affiliation:_____

Address:_____

_____ **Postcode:**_____

Tel No:_____ **Fax No:**_____ **Email:**_____

Please indicate any special dietary or other requirements (such as disabled access):_____

YOUR NAME BADGE

Please enter the information below in **BLOCK CAPITALS** as you would like it to appear on your name badge

First Name:_____ **Family name:**_____

Organisation/Affiliation:_____

YOUR PAYMENT

● **For all participants: The Society DOES NOT INVOICE for conference fees. Please treat your completed booking form as an invoice. Cheques must be in £ STERLING ONLY and made payable to 'The Society for Applied Microbiology'. Foreign cheques/ drafts MUST be negotiable for the full amount due.** We accept payment **ONLY** by the following credit and debit cards: VISA, Mastercard, Eurocard, Delta, Electron, JCB, Maestro and Solo.

☐ **Cheque enclosed** ☐ **Please charge my *Mastercard/Visa card /Debit card*** *(please delete inapplicable items)*

TOTAL Amount enclosed/ to be charged: £_____

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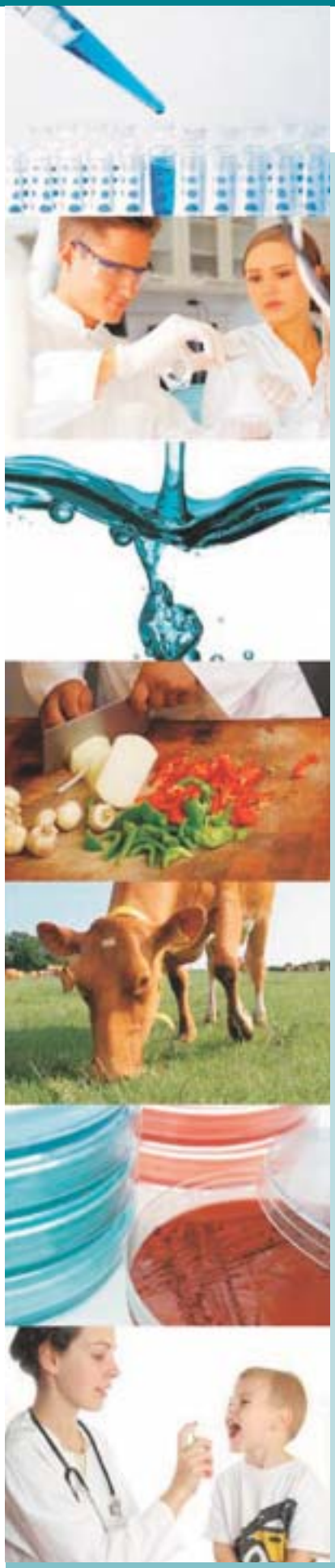


Coming soon...

Spring Meeting 2009

3rd Broadening Microbiology Horizons in Biomedial Science

22 April 2009, Aston University, Birmingham

Including talks on:

- Bioterrorism
- Emerging respiratory viruses
- Device Related Infections

The equivalent meeting in 2008 proved to be extremely popular and potential delegates wer turned away because it was oversubscribed. This has resulted in the Society hiring a larger lecture room with improved facilities for the 2009 event.

Summer Conference 2009

Fur, feather and fever — zoonotic challenges of the 21st century

6 - 9 July 2009, Manchester Metropolitan University

Including sessions on:

- Arthropod borne zoonoses
- Wildlife and companion animals
- Livestock and foodborne zoonoses
- Emerging and re-emerging zoonoses

For the latest information please visit the website at: www.sfam.org.uk/winter_meetings.php

Valerie Edwards-Jones explores the role of alternate strategies in the fight against antibiotic resistance

Alternate clinical antimicrobial strategies

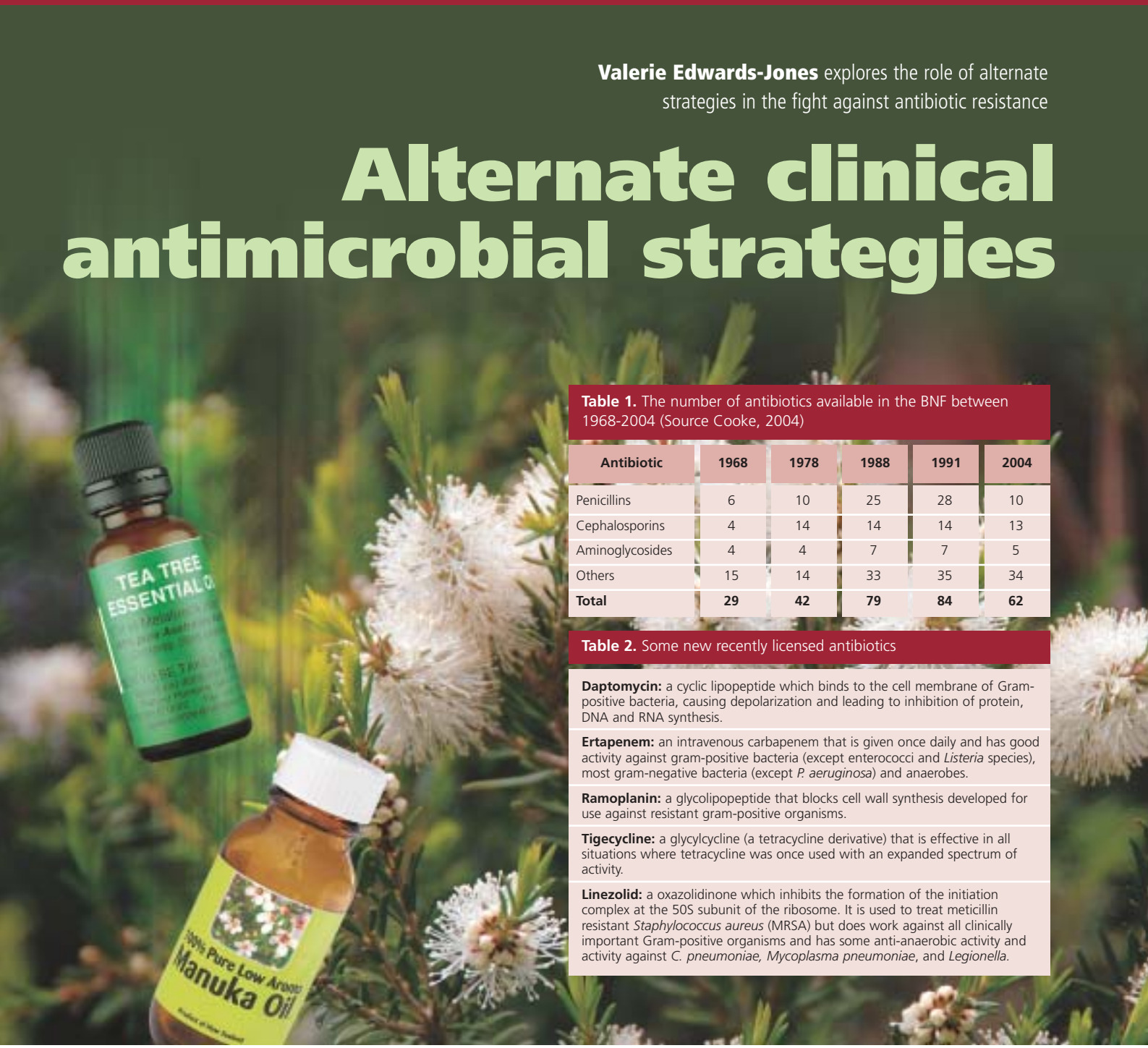


Table 1. The number of antibiotics available in the BNF between 1968-2004 (Source Cooke, 2004)

Antibiotic	1968	1978	1988	1991	2004
Penicillins	6	10	25	28	10
Cephalosporins	4	14	14	14	13
Aminoglycosides	4	4	7	7	5
Others	15	14	33	35	34
Total	**29**	**42**	**79**	**84**	**62**

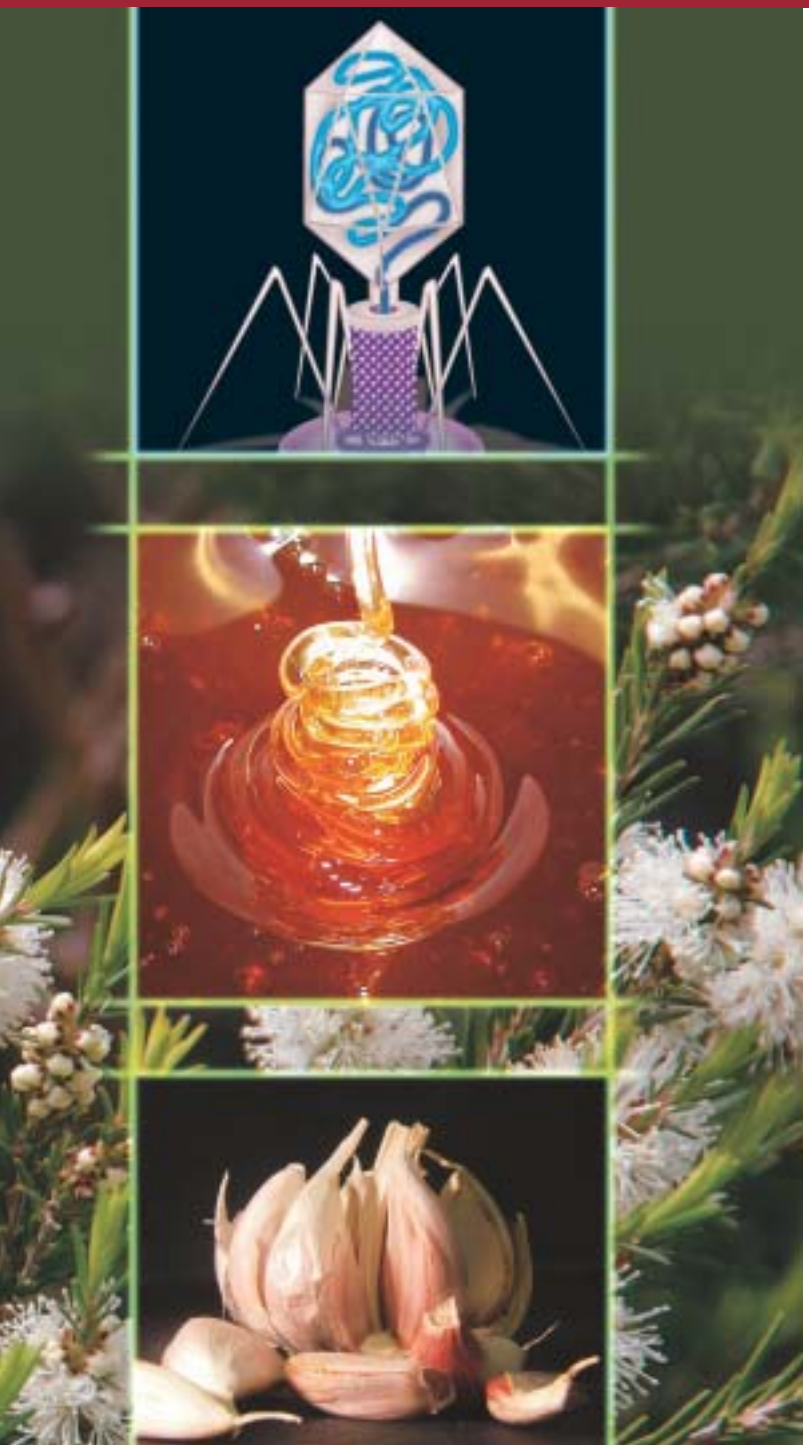
Table 2. Some new recently licensed antibiotics

Daptomycin: a cyclic lipopeptide which binds to the cell membrane of Gram-positive bacteria, causing depolarization and leading to inhibition of protein, DNA and RNA synthesis.
Ertapenem: an intravenous carbapenem that is given once daily and has good activity against gram-positive bacteria (except enterococci and *Listeria* species), most gram-negative bacteria (except *P. aeruginosa*) and anaerobes.
Ramoplanin: a glycolipopeptide that blocks cell wall synthesis developed for use against resistant gram-positive organisms.
Tigecycline: a glycylcycline (a tetracycline derivative) that is effective in all situations where tetracycline was once used with an expanded spectrum of activity.
Linezolid: a oxazolidinone which inhibits the formation of the initiation complex at the 50S subunit of the ribosome. It is used to treat meticillin resistant *Staphylococcus aureus* (MRSA) but does work against all clinically important Gram-positive organisms and has some anti-anaerobic activity and activity against *C. pneumoniae, Mycoplasma pneumoniae*, and *Legionella*.

With increasing numbers of antibiotic resistant bacteria, clinicians are now faced with fewer treatment options and are prescribing drugs which are often expensive and sometimes highly toxic. Some antibiotics are no longer effective and the number available for prescription in the British National Formulary (BNF) decreased by 22 between 1991 and 2004 (see table 1).

It is expected that new antibiotics will be brought onto the market in the near future. However this can be cost prohibitive, as it is estimated that £300-£550m developmental investment is needed, yet only 10% of new agents which begin assessment through clinical trials, end up going to market. This is a costly business, especially when the end product may have a finite lifespan through the development of antibiotic resistance. It is becoming more evident that new strategies are needed in order to outwit microorganisms or we need to employ alternative ways of using antibiotics more effectively in an attempt to prevent the development of resistance (see table 2).

Antibiotic resistance has been demonstrated in a range of pathogenic bacteria; however MRSA is the most notorious. Primarily because *S. aureus* is the most common pathogen isolated from a wide range of infections. In the recent Healthcare Associated Infections Report (2008) produced by the Health Protection Agency, UK, *S. aureus* was shown to cause the majority (48%) of surgical site infections (SSI's), with MRSA accounting for the highest proportion of these (64%). This has increased litigious claims against the NHS and recently over £5million was paid to a celebrity who contracted *S. aureus* (in this case MSSA) nosocomially. Three cases of vancomycin resistant MRSA were reported in the USA in 2002 and in the future there may be even fewer antibiotics available to treat this common pathogen. There are a number of reasons why antibiotic resistance has developed and measures have been put in place to reduce inappropriate use of antibiotics by clinicians (for example, prescribing



antibiotics for a viral sore throat) but the ability to purchase 'over the counter' antibiotics abroad (and now freely available to purchase over the internet) is a difficult problem to tackle unless there is a global effort.

The increasing incidence of antibiotic resistance has necessitated the implementation of The Antimicrobial Resistance Action Plan 2002-2005 whereby six priority action areas were targeted to minimise further development. These were:

- Prudent antimicrobial use in humans in the community
- Prudent antimicrobial use in humans in hospitals
- Prudent antimicrobial use in animals
- Infection control
- Education, information dissemination and research
- Surveillance

In all six areas there has been increased research and funding allocation, and hopefully we will see a downturn in the development of antimicrobial resistance in the future.

To challenge the problems of antibiotic resistance we need to ensure that all antibiotics are used appropriately. In many hospitals and primary care trusts, pharmacist-facilitated restriction programmes are in use together with provision of advice on the use of narrow spectrum instead of broad spectrum antibiotics. Combination therapy and different forms of antimicrobial administration may help to resolve the problem. For example, continuous versus intermittent antimicrobial therapy and targeted release of antibiotics are some of the new ways forward.

Although we are looking more carefully at how we use the antibiotics we have, there is now increasing interest in antimicrobial therapies which were used before the advent of antibiotics. We are now returning to traditional remedies and medicines used before that era. Many of the drugs currently used were initially derived from plants, so now this area of medicine is one key theme of development and there are a plethora of articles being published by peer-review journals.

So how did we all survive infection before the introduction of antibiotics and vaccination? In some areas of the world, although antibiotics are available, they are not the first line of defence. In Russia for example, bacteriophage therapy is widely used and in many far eastern countries, including China, herbal medicine is more widely utilised than antibiotics.

However, there are other ways in which systemic and topical infections can be treated. Some of these are reviewed below but this report does not form an exhaustive list. Some new preventative and treatment measures for systemic infections are listed in table 3.

Table 3. Alternate systemic preventative and treatment strategies

Peptide antibiotics
Bacteriocins - Lantibiotics
Vaccine therapy
Phage therapy
Bacterial interference / Probiotics / Prebiotics
Herbs and plant extracts

Peptide antibiotics

There are two classes of peptide antibiotics: Non-ribosomally and ribosomally synthesised peptides. Non-ribosomally synthesised peptides are produced predominantly by bacteria (e.g. gramicidins, polymixins, and bacitracins) and were superceded as other new classes of antibiotics were produced, often with a broader spectrum of activity. However, there is renewed interest in the exploitation of these antibiotics and we have seen modification of the insoluble streptogramins producing two water soluble antibiotics, Dalfopristin and Quinopristin (Synercid™). Research into the potential of further chemical modification producing effective alternatives is awaited.

Ribosomally synthesised cationic peptides are produced by all species of life (including bacteria) as part of the innate defence mechanism of the host. They are known as *nature's antibiotics*. Mammalian, insect, amphibian, plant, and bacterial peptides (bacteriocins) have been identified. Frog skin has been used as an antimicrobial agent for centuries in South America and is still used as it contains a 24 amino acid peptide, Bombinin, which is haemolytic. Melittin — another

antimicrobial cationic peptide from bee venom has not been exploited due to the toxic nature of this defensin. (Hancock & Chapple 1999).

Bacteriocins are ribosomally synthesised peptides which are classified in several ways including the producing strain, common resistance mechanisms, and mechanism of killing. These include the bacteriocins from gram-positive bacteria, the colicins from *E. coli* and pyocins from pseudomonads. The bacteriocins of lactic acid-fermenting bacteria are known as **lantibiotics**. These are very potent lanthionine-containing antibiotics whose properties are attributed to their structure. They possess unique intramolecular ring structures formed by the thioether amino acids lanthionine or methyllanthionine that provide structural rigidity for binding their cellular targets and help with stability against protease degradation. They are produced and act primarily on Gram positive bacteria. The most well known is Nisin, which has been used in the dairy industry for almost 30 years.

The classification scheme for bacteriocins is still the subject for much debate and a new scheme has been proposed in an article in Nature (2006). A summary of the proposed scheme is shown in table 4.

Table 4. Classification of bacteriocins (Modified from Heng & Tagg [2006)

Class I — lantibiotics, small peptide inhibitors
Class II — small (<10 kDa) heat-stable post-translationally unmodified non-lantibiotics, further subdivided into:
subclass IIa — disrupt mannose transport
subclass IIb — disrupt proton gradient
subclass IIc — have a wide range of effects including membrane permeability and cell wall formation
Class III — large (>30 kDa) heat-labile non-lantibiotics
Class IV — cyclic peptides

Vaccine Therapy

Viral infections are difficult to treat and there are limited effective antiviral agents. The development of protective vaccines against highly contagious viral agents has proven to be a successful strategy and many serious diseases are no longer a threat. A good example is smallpox, and hopefully polio will also be eradicated. The development of vaccines for all infectious agents would be a dream for the future, however there are major difficulties with the immunogenicity (for example a vaccine for group B meningococcal infections) and protective nature of vaccines, as well as the cost–effectiveness, which is a major factor in decision making for health care officials. Some diseases are considered non-life threatening and it is therefore more cost-effective to treat them with antibiotics. Here, vaccination programmes are not seen as a necessity. However the development of antibiotic resistance to some common pathogens have left them difficult to treat with antibiotics. As increased numbers of deaths occur with common infections, then expansion in vaccine production has taken place.

We have successfully produced vaccines against *Bordetella pertussis*, *Haemophilus influenze* type B and *Neisseria meningitidis* — whereby the vaccines prevent the disease. Also, toxoid vaccines such as diphtheria and tetanus inhibit the virulent toxins from mediating the disease. The incidence of these reported diseases have reduced dramatically in the developed world, whilst common disease caused by staphylococci remains prevalent. Although on most occasions staphylococcal disease is self limiting, life threatening complications and a lack of antimicrobial treatments have produced a renewed interest in research into the production of staphylococcal vaccines, especially for MRSA. As most invasive strains of *S. aureus* have either type 5 or type 8 capsules, this component has been used in staphylococcal vaccine development for a number of years (StaphVax). But recently this failed to protect kidney patients from development of *S. aureus* infections in a phase III clinical trial. However, additional virulence determinants such as T336, Panton-Valentine Leukocidin (PVL) and alpha toxin are planned to improve efficacy in the next generation of StaphVax (Nabi, Pharmaceuticals). Once developed, how this vaccine could be most effectively put to use in the future is subject to debate. Our immune system is in constant contact with staphylococcal antigens and many strains are commensal on human epithelia. That said, there is evidence to show that a vaccine containing alpha toxin showed protection in mice (DeLeo & Otto, 2008). New ideas for staphylococcal vaccines have evolved whereby combinatory vaccines target microbial surface components recognizing adhesive matrix molecules (MSCRAMMs), a family of bacterial proteins that bind to human extracellular matrix components (Otto 2008). This means that a person could be protected from staphylococcal infection through inhibition of binding in the first instance.

Bacteriophage therapy

Lytic phage therapy has been effectively used in Russia for decades and can be effective against a number of pathogens (Stalin therapy). This treatment is reliant on a cocktail of bacteriophages and is relatively non-toxic to the host but lethal to bacteria. Bacteriophages are highly specific and attach to the bacteria through specific receptors on the membrane surface. Once internalised they multiply and at the final stage of the replication cycle, cause cell death through bacteriolysis. They can be administered orally, intramuscularly, and topically and this treatment strategy is now subject of a range of research programmes. Hanlon, (2007) reviewed the use of bacteriophages in a range of applications and the reader should be referred to this article for further reading. The pharmacokinetics is such that the bacteriophages will reproduce within the susceptible bacterial cell and the need for second dosage should be unnecessary, thus resulting in a cheap, effective and specific way of treating a range of diseases. However, one should not forget that some bacteria are resistant to bacteriophages (often because they have already integrated phages within their genomes making them resistant to infection with new phages).

An alternate way of using bacteriophages is with genetically engineered phage therapy to deliver instructions for cell death. This is also a subject of intensive research. Here, non-lytic phages deliver DNA encoding bactericidal proteins leading to programmed cell death of the bacterium without lysing the cell. This is a good model to explore in future treatment strategies (Sulakvelidze *et al.*, 2001). Other workers have used an alternative strategy whereby a genetically engineered non-replicating, non-lytic phage is used to combat an experimental *Pseudomonas aeruginosa* infection by swapping an export protein gene of the *P.*

aeruginosa filamentous phage Pf3 with a restriction endonuclease gene. The phage efficiently kills a wild-type host *in vitro*, while endotoxin release is kept to a minimum as there is no bacterial cell lysis. This can be a complication of phage therapy if endotoxin is released into the bloodstream, causing endotoxic shock. Thus, the use of a non-replicating modified phage for the delivery of genes encoding proteins which are toxic to bacterial pathogens, may open up a new avenue in antimicrobial therapy (Hagens *et al.*, 2004)

Bacterial interference

Using one bacteria to prevent infection or expression of virulence is not something to dismiss out of hand. There is increasing evidence of success with the use of probiotics (predominantly *Lactobacillus* sp.) with or without prebiotics to prevent infection especially with gastrointestinal infections, the most notable and problematic at present being *Clostridium difficile*. An example of this phenomenon can be seen in figure 1.

Figure 1. *the inhibition of MRSA by Leuconostoc sp (a lactic acid bacteria)*

Taking this work a little further, other groups have studied the genetic regulation of growth and virulence production in a number of pathogens. Effector molecules (oligopeptides in Gram positive bacteria and N-acylhomoserine lactones in Gram negatives) accumulate, and facilitate cell-to-cell communication and alteration of gene expression. Thus, by understanding these systems it is hoped that eventually novel therapeutic targets can be designed, and purified signalling molecules may be used as new treatments or as potential vaccine targets (McDowell *et al.*, 2001).

Herb and plant extracts

There has been extensive work on the use of herb and plant extracts in the treatment of infectious disease, however this article will merely touch upon the main alternative therapies in this area. The antimicrobial nature of plant extracts is a huge subject area but should not be overlooked. An excellent starting point is a review produced by Cowan in 1999. Since then the number of publications in this area has expanded exponentially. Some of the topical alternative treatment strategies available are:

- Photodynamic antimicrobial chemotherapy (PACT)
- Nanocrystalline silver
- Medicinal Grade honey dressings, manuka honey dressings
- Essential oils — Tea tree gels (burn dressings)
- Natural Herb and Plant extracts
- Maggots

Photodynamic antimicrobial chemotherapy (PACT)

This technique utilises photosensitizers and visible or UV light (lasers) to create a phototoxic response within the cell, normally via oxidative damage (Wainwright, 1998). The excitation of aromatic molecules creates a singlet oxygen as well as other toxic oxygen species that excerpt the antimicrobial effect. A range of compounds, including methylene blue, toluidine blue, and furanocoumarins - a natural photosensitizer - are used. This method has been used in the sterilisation of blood products (Wainwright, 2002) and in dentistry (Konopka *et al.*, 2007) for use in biofilm removal as well as deep root canal infection.

The technique also has applications in chiropody because the photosensitizers once applied are relatively accessible to illumination. The NEW Biogun Micro™ currently marketed by Dentron Ltd is actively being used for clinical treatment of verrucae, athlete's foot, infected leg ulcers and other nail infections. http://www.dentron.co.uk/biogun_application.htm (see figure 2).

Figure 2. *The NEW Biogun Micro™*

Nanocrystalline silver

Silver has been used as an antimicrobial agent since antiquity and is incorporated into a number of materials and applications (e.g. catheters, cloth commercially available pyjamas incorporating silver at approximately £45.00, silver socks for those unfortunate people who have sweaty feet!). Since 2002, the numbers of silver impregnated wound dressings have increased dramatically and in 2006, accounted for £23m of sales in the UK. Nanocrystalline silver appears to have superior antimicrobial activity over normal crystalline

silver and this is accounted for by diminished particle size (20-120nm) which increases surface area allowing the sustained release of silver ions over 3-7 days (depending upon the product) and maintains a level of 70-100ppm *in vitro* (Dunn & Edwards-Jones, 2004). Recent studies have shown that nanocrystalline dressings appear to be more effective against MRSA (Edwards-Jones 2006). Leaper (2008) has recently published an excellent review of silver dressings (see figure 3).

Figure 3. *A range of silver dressings*

Medicinal Grade Honey Dressings

Honey has been used for centuries as an antimicrobial agent. It has remained in constant use in Russia and third world countries despite the availability of antibiotics and other sophisticated wound dressings. In the past five years, wound dressings impregnated with honey have become well accepted by wound care practitioners, as the high content of the sugar, hydrogen peroxide species (Brudzynski, 2006) and propalis are components all known to be antimicrobial. There have been a number of *in vitro* studies demonstrating the antimicrobial activity against MRSA and vancomycin resistant enterococci (Cooper *et al.*, 2002). Manuka honey is also gaining popularity. This honey is made by bees pollinating the New Zealand Manuka tree (*Leptospermum scoparium*). Manuka honey dressings are licenced for use UK.

Essential Oils (Aromatherapy oils)

These are volatile organic constituents of fragrant plant matter that contribute to the flavour and fragrance of the plant. They are produced by steam distillation, cold pressing or by organic solvents and the oil yield is effected by environmental conditions and distillation processes. Yield is known to vary within batches from the same trees and between sites. Plant essential oils are secondary metabolites. Table 5 illustrates essential oils and their respective plant source.

Composition and Chemistry of essential oils.

Essential oils are complex mixtures of organic compounds with related chemical structures originating from a single botanical source. Significant differences in chemical composition of oils from the same type of plant give rise to chemotypes. For example, in thyme oil; the predominant component of chemotype A is thymol, whereas that of chemotype B is linalool. All components are hydrocarbons — a single terpene unit (monoterpene) is formed from two molecules of isoprene units (10 carbon atoms) — the basic unit found in nature. Sesquiterpenes have three isoprene units (15 carbon atoms) and are less common, but some oils can be formed predominantly from these units, e.g. chamomile oil. Essential oils can also contain oxygenated terpenoids e.g. alcohols, aldehydes, ketones, esters, phenols, oxides, peroxides, lactones, acids, and furans (see figure 4).

Table 5. Essential oils can be obtained from every part of a plant

● Flowers:	rose	● blossoms:	ylang ylang
● bark:	cinnamon	● Seeds:	fennel
● Leaves:	peppermint	● Grass:	lemongrass
● gums:	frankinsense	● Roots:	horseradish
● Fruits:	lemon	● Woods:	cedar
● bulbs:	garlic		

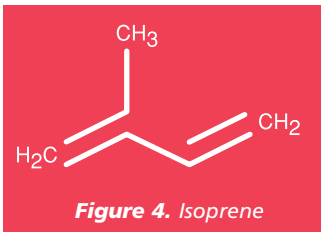


Figure 4. *Isoprene*

Tea-Tree Oil (TTO)

This is probably the most well known and well researched essential oil. Originating from Australia, tea-tree oil (*Melaleuca alternifolia*) is reported to have antibacterial, antifungal, antiviral, anti-inflammatory and analgesic properties. It contains 97 different components identified using GC-MS. The major terpenes are terpinen-4-ol (38%), γ-terpinene (20%), α-terpinene (10%), 1,8-cineole (4%) and α-pinene (5%) and the major antimicrobial components: terpinen-4-ol, γ-terpinene, α-terpinene, 1,8-cineole, α-pinene, α-terpineol, α-terpinolene, (Carson & Riley 1995). The mode of action of Tea-tree oil is by disruption of the cell membrane causing potassium leakage. The cyclic monoterpenes (lipophilic) integrate with membrane structures (phospholipid) and cause membrane leakage. There is also inhibition of glucose dependant respiration in *S. aureus*, *E.coli* and *C. albicans*. In *C. albicans* inhibition of ion transport processes and respiration causes increased membrane permeability (Cox *et al.*, 2000). Applications for TTO in medical use range from shampoo for head lice to dressings for burns patients. (Carson *et al.*, 2006). The effective concentration of essential oils ranges from 0.125%-5% above which their safety and efficacy can be questioned (see table 6).

Table 6. Toxicity of essential oils

- A number of deaths have occurred due to accidental ingestion of wintergreen
- Rosemary contains 10-20% camphor which is dangerous in pregnancy and epilepsy
- Skin sensitisation is a major problem (especially if used undiluted)
- Some are phototoxic (bergamot)
- Sold in most countries without any hazard warnings

Figure 5. *Lucilia sericata*

Aromatherapists use blends of essential oils for fragrance and other known therapeutic effects. Several microbiological studies have demonstrated that there is improved effect when essential oils are blended (Edwards-Jones *et al.*, 2004; Lis Balchin 1997)), and there are synergistic effects with known biocides (Cannon & Tompkins 2006) and antibiotics (Hemaiswarya *et al.*, 2008; Rosato *et al.*, 2007). It may be that the essential oils are opening channels in cell membranes, allowing entry of antimicrobial agents where otherwise entry is resisted.

One area that may have huge potential in the future is with the antimicrobial effect of essential oil vapours for decontaminating environments, preserving foods and potentially in wound dressings (Edwards-Jones *et al.*, 2004; Fisher *et al.*, 2007)

Maggots

Finally my favourite.. *'natures little surgeons'*..maggots. These are increasingly used in chronic wound infections where there is no advancement of wound healing. It is now accepted that there is likely to be a biofilm persisting on the surface of the wound, resulting in a non-healing wound. It is difficult to remove biofilms from any surface and treatment with antiseptics or disinfectants often fail. Maggots (*Lucilia sericata*) will debride a problem wound, removing dead and decaying tissue without removing viable tissue (see figure 5). Some authors have found that the secretions from these maggots are antimicrobial but the nature of these is yet to be elucidated. Many patients find it difficult to undergo treatment with maggots and hopefully they won't have to if other alternate treatments are accepted and researched thoroughly.

Professor Valerie Edwards-Jones
Manchester Metropolitan University

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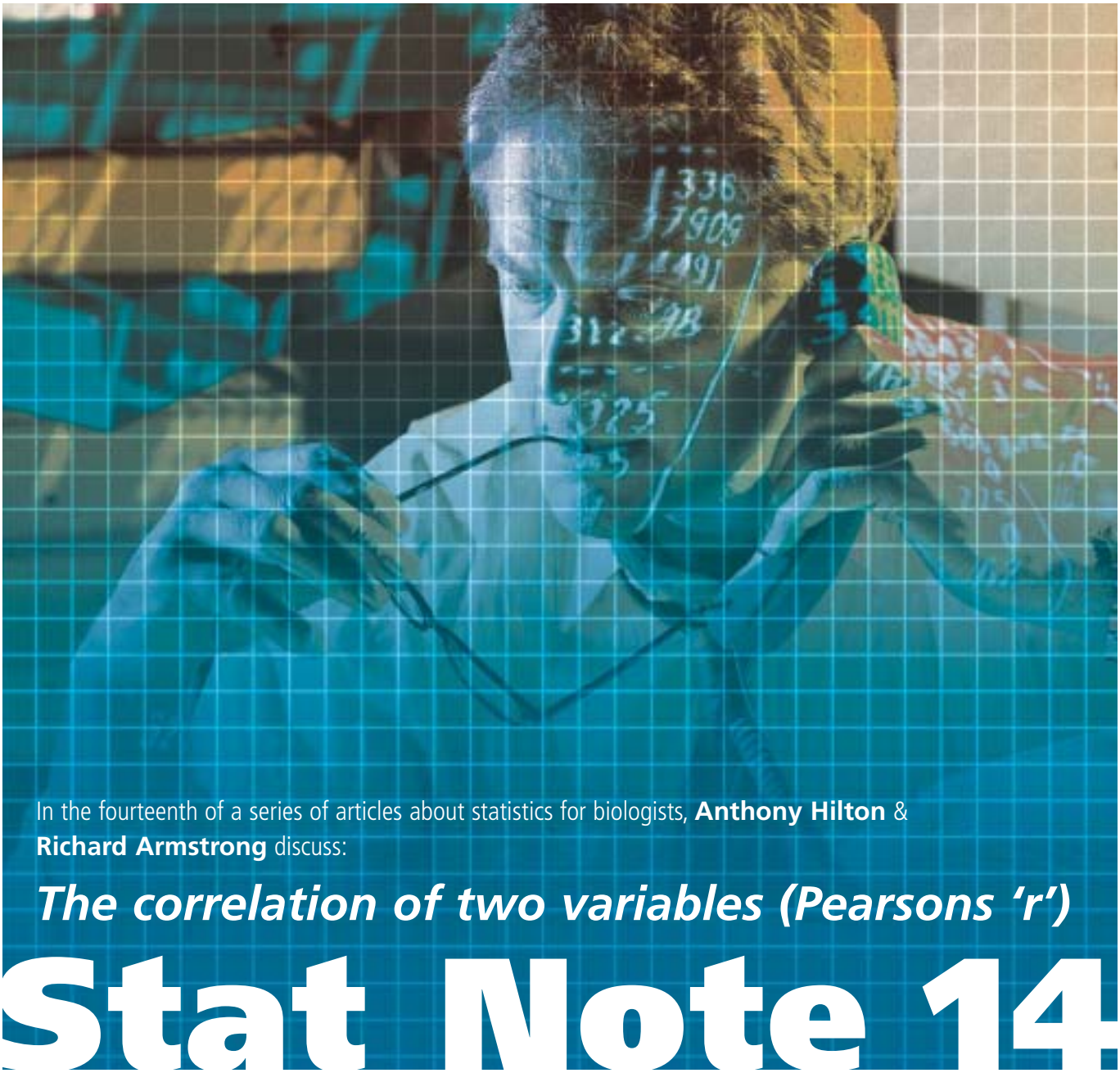


In the fourteenth of a series of articles about statistics for biologists, **Anthony Hilton** & **Richard Armstrong** discuss:

The correlation of two variables (Pearsons 'r')

Stat Note 14

Testing the degree of correlation between two variables is one of the most widely used of all statistical methods. Nevertheless, tests based on correlation can be easily misinterpreted resulting in erroneous conclusions being drawn from an investigation. In the field of microbiology, correlation methods may be used in a wide variety of circumstances. Hence, an investigator may wish to study for example the correlation between bacterial biomass in a fermentation flask and the concentration of a media supplement, or between the degree of penetration of an antiseptic compound into the skin and skin depth.

Microbiologists may have several objectives in mind when studying the correlation between two variables. First, they may wish to determine whether there is a statistically significant relationship between the two variables i.e., does one variable change in a consistent manner as the other changes? Second, they may wish to test whether the relationship is positive or negative i.e., does one variable increase or decrease as the other changes? Third, they may wish to measure the degree of statistical significance that can be attached to the correlation. Fourth, it may be important to determine what proportion of the variability in the Y variable that can be accounted for or 'explained' by the X variable, e.g., how much of the variation in bacterial biomass can be explained by the concentration of a media supplement? This Statnote examines the use of the most widely used statistic in correlation studies, *viz.*, *'Pearson's product moment correlation coefficient'*('r').

Naming variables

In most applications, a test of correlation establishes whether there is a *linear* relationship between two different

variables. The two variables are usually designated as *Y* the *'dependent'*, *'outcome'*, or *'response'* variable and *X* the *'independent'*, *'predictor'*, or *'explanatory'* variable. For example, in a study of the relationship between bacterial biomass and concentration of media supplement, the supplement is the independent variable *X* and bacterial biomass the dependent variable *Y*, since *Y* is clearly dependent on *X* and not *vice versa*. In some circumstances, it may not be obvious which is the dependent and independent variable, e.g., two independent measures of the abundance of a bacterium in a particular sample under investigation, and the variables may then be designated X_1 and X_2.

Scenario

As an example of the application of this type of analysis, consider the following experimental scenario.

Background

Adequate skin antisepsis prior to invasive procedures is important in preventing infections. Nevertheless, skin antiseptics permeate poorly into the deeper layers of the skin and into hair follicles, which may harbour microorganisms and cause infection when the protective skin barrier is broken. One potential mechanism of delivering antiseptics deeper into the skin is to co-administer a 'carrier' to facilitate movement through the various skin layers. Hence, the aim of the study was to evaluate the permeation of a commonly used biocide into the full thickness of human skin when applied alone, or in combination with a carrier compound.

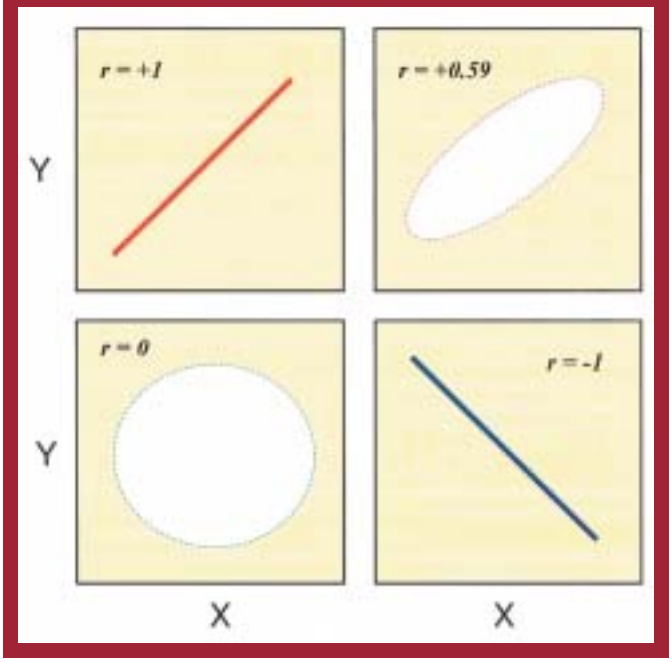
Method

Full thickness human skin samples were obtained from patients undergoing breast reduction surgery. The skin permeation studies were performed with vertical diffusion cells with the stratum corneum of the skin sample uppermost. One ml of antiseptic solution in the presence and absence of the carrier compound was aliquoted onto the skin, and incubated for 2 minutes, 30 minutes, or 24 hours. The assay was performed in triplicate. Following the exposure to the antiseptic solution (+/- carrier) the skin was washed with PBS and three 7mm punch biopsies taken from each sample. The biopsies were cut with a microtome into 20µm slices from the skin surface to a depth of 600µm and 30µm slices from 600µm to 1500µm. The weight of the skin samples was determined and each analysed by HPLC to determine the concentration of antiseptic present as µg antiseptic per mg of tissue. A number of mathematical models might describe the pattern of penetration of the skin by the antiseptic. In this preliminary analysis, we wished initially to test whether the antiseptic alone, i.e., without carrier and after 30 minutes, would have penetrated the skin according to a *'power-law'* model. A variable (Y) is distributed as a power-law function of X if the dependent variable has an exponent 'a', i.e., a function of the form $Y = CX^a$. If penetration of the antiseptic does follow such a law, then a log-log plot of the data should reveal a linear relationship between concentration of the biocide and skin depth penetration. Hence, log concentration is plotted against log skin depth and Pearson's correlation coefficient ('r') can be used to test the degree of linearity of the plot.

The 'product moment correlation coefficient' (r)

The most widely used statistic in correlation studies is the

Figure 1. *Interpretation of Pearson's product moment correlation coefficient ('r')*



'product moment correlation coefficient' (given the symbol r) first proposed by the statistician Karl Pearson in 1902. Pearson's r is given by the ratio:

$r = \Sigma xy/\sqrt{(\Sigma x^2 \Sigma y^2)}$ …….. (1)

where Σx^2 is the sums of squares (SS) of the *X* values, Σy^2 is the SS of the *Y* values, and Σxy is the sum of products of the individual pairs of *X* and *Y* values. Hence, the denominator of *r* is the square root of the product of the SS of *X* and *Y* i.e., it is a combined estimate of the individual variations of *X* and *Y*. The numerator of *r* is a measure of how the two variables vary together. If the individual variations in *X* and *Y* were completely explained by the fact that *X* and *Y* were linearly related to each other this ratio would be unity (Snedecor & Cochran, 1980).

What does 'r' mean?

The correlation coefficient takes values from +1 to –1 (Figure 1). When $r = +1$, all the data points will lie without deviation on a straight line of positive slope (maximum positive correlation) and when $r = -1$, all the data points will lie on a straight line of negative slope (maximum negative correlation). By contrast, when $r = 0$, no linearity is present, and the data points are scattered more or less randomly within the two-dimensional space defined by *X* and *Y*. Intermediate values of *r* result from data points scattered around a fitted line; less scatter when *r* is close to 1 and a greater degree of scatter when *r* is closer to zero.

Having calculated *r* from the data, its absolute value, ignoring the sign, is compared to the distribution of *r* to obtain a *P* value. This can be obtained from statistical software or by using a table of the correlation coefficient (Fisher & Yates, 1963), entering the table for n - 2 degrees of freedom (*DF*) where *n* is the number of pairs of observations. Pearson's correlation coefficient has n - 2 *DF* because the mean of the *X* and *Y* values are calculated from the data to make the test (Snedecor & Cochran, 1980) and therefore,

Figure 2. *Relationship between the degree of penetration of the biocide (without carrier) and depth of skin (Pearson's correlation coefficient r = -0.89, r^2 = 0.79)*

there are two restrictions in the calculation of r.

The relationship between log concentration of antiseptic and log skin depth is shown in Figure 2. The value of r is -0.89 which is highly significant at the P = 0.001 level of probability i.e., the probability is less than 1 in 1000 of obtaining a value of r of this magnitude by chance, when there is no correlation present. Hence, there is a statistically significant linear decrease in the log of concentration of the antiseptic with the log of increasing skin depth and hence, penetration of the antiseptic without a carrier is consistent with a power-law function i.e., most absorption occurs within the immediate surface layers with very small amounts reaching the deeper layers.

Limitations of '*r*'

The correlation coefficient r has a number of limitations. First, in most applications, r tests whether there is a *linear* relationship between the two variables. Some non-linear relationships, although exhibiting a significant relationship between X and Y could result in a non-significant r.

Second, the square of the correlation coefficient r^2, also known as the '*coefficient of determination*', measures the proportion of the variance associated with the Y variable that can be accounted for or 'explained' by the X variable. When large numbers of pairs of observations are present, e.g., >50 pairs, examination of the statistical table for r (Fisher & Yates, 1963) reveals that values as low as 0.3 could be significant. Hence if r = 0.3, r^2 = 0.09 or expressed as a percentage, only 9% of the variation in the Y values would be accounted for by the independent variable X. This property of r can cause considerable confusion in the interpretation of the results of a study. For example, there may be a *significant* correlation between two variables, but the value of r may be so low that the X variable accounts for a very small proportion of the variance in Y. Hence, a significant r may not be biologically meaningful if it accounts for a very small proportion of the variance. In the present example, however, approximately 79% of the variance in log concentration of the biocide was attributable to log of skin depth, a highly significant amount.

Third, care is needed to ensure that non-homogeneous groups are not included in the correlation. For example, if measurements of X and Y were made from two samples of skins differing substantially in depth (say the 'surface' and 'deeper' layers), then r calculated within each group separately may not be significant. It would be inappropriate in this circumstance to combine the groups and to calculate r on the pooled data because even if r was then significant it would not reflect a true linear relationship between X and Y but only that there was a significant mean difference between the layers.

Fourth, in many correlation studies a significant value of r does not imply that there is a 'causal' relationship between the two variables or indeed, that there is any relationship between them at all. Two variables can be mutually correlated not because they are directly related but because both have a significant degree of correlation with a third variable. This circumstance commonly arises in non-experimental studies where there is a high probability that other variables are involved. Consider analysis of the data that reveals a strong positive correlation between the consumption of ice-cream and the incidence of sunburn! A useful statistic when there are multiple variables present is the '*partial correlation coefficient*', i.e., the degree of correlation between two variables when the effect of a third 'confounding' variable is removed (Snedecor & Cochran, 1980). In addition, investigators often use a technique called '*stepwise multiple regression*' to separate out the effects of individual variables and this method will be discussed in a future Statnote.

A correlation test provides only limited information as to the relationship between two variables. Fitting a regression line to the data using the method known as '*least squares*' provides much more information and the methods of regression and their application in microbiology will be discussed in the next Statnote.

acknowledgment

We thank Tarja Karpanen and Tony Worthington (both of Aston University) for the use of data to illustrate this Statnote.

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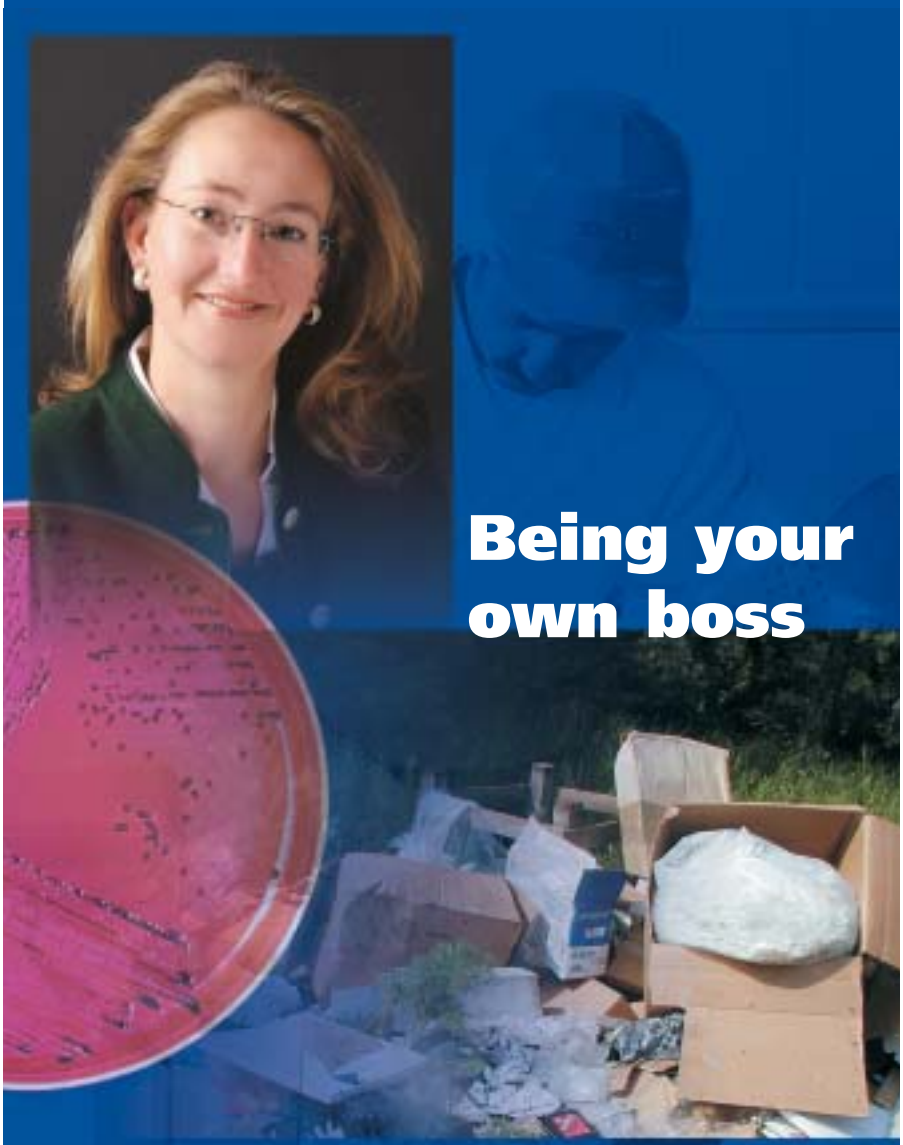
Anthony Hilton


Richard Armstrong

Dr Anthony[1] Hilton and Dr Richard Armstrong[2]
[1]Biology & Biomedical Sciences and [2]Vision Sciences, Aston University, Birmingham, UK

careers



Being your own boss

Dr **Belinda Stuart-Moonlight**, is a Chartered Environmental Health Practitioner with her own consultancy business (Moonlight Environmental Ltd). She qualified as an Environmental Health Officer and worked for approximately 15 years in local authority. She then went on to be appointed Junior Research Fellow at King's College University of London, where she researched in the fields of bacterial survival in kitchens and the legal context of food hygiene. Belinda is a former chairman of the London Food Study Group, part of the Chartered Institute of Environmental Health (CIEH). Belinda's private practice work has built up over ten years and includes food safety and health and safety consultancy, auditing, training and expert witness services. She regularly takes commissions for work from the CIEH and takes instructions in litigation cases (working both for legal teams of enforcers and defendants). Belinda's consultancy work for local authorities includes the development of compliance improvement strategies, particularly in difficult-to-reach communities.

Here she describes a typical week in her life.

Monday 9th June 2008: the alarm goes off at 02.59. That's the price I pay for having a weekend out of the office and playing with the kids. If the myth persists running your own business and being a consultant means that you can lie in bed in the morning whilst considering your burgeoning bank balance, I'm here to dispel it! The huge difference between being an employee and being the boss is that the buck stops here. Every piece of work you do is judged; any cock-ups and you lose your clients: you lose your income.

This is going to be a hard week, I think, as I wipe the sleep out of my eyes and kiss goodbye to baby Rhu in the cot beside my bed. I have a 6am meeting, 70 miles away in London, in which I have to brief a client about the risks of running a food market inside the avian flu surveillance zone. Just before I leave I look in on Hamish, nine, and Angus, three, blissfully sleeping in their room, then I check the internet for news on the flu outbreak in Surrey. I need to be sure I am fully informed about the latest position.

By 4.30am I'm off, with breakfast on the seat beside me. I am well aware of the irony that this environmental health practitioner, ever pushed for time, drives a health hazard on wheels. Meals on the move mean the passenger foot well could act as a reference lab for all sorts of bugs.

I'm in south-east London just before my 6am meeting. My client is an artisan baker, whose ethically and passionately-run business is relatively young. I provide consultancy in food safety and health and safety. My meeting is with a linked business that sells its products throughout the south of England. The meeting about avian flu risks and controls is straightforward and complete by 7am.

We then begin a morning's work on health and safety, which includes a discussion on occupational health, about four members of staff in particular. One has recurrent lung problems; another has a broken hand; a third, ligament damage in his foot; and the fourth, a very tall baker who has been employed for just two weeks, complaining about backache.

Avoiding potential litigation is a very significant element of my job as a consultant. Much of my work is to positively promote staff health by

instilling a health and safety culture and implementing safe systems of work with appropriate training. Of course, there are always "chancers" who will try to get compensation for the slightest knock or scrape. I therefore have to ensure my clients have done all that is required of them by law. It is critical that the documentation is in place ready for potential claims.

I have been involved with a number of criminal health and safety prosecutions over the years. Most recently, a high profile case of a leading DIY store failing to adequately risk-assess their vehicular movements resulted in a member of staff being squashed by a fork lift truck. The costs alone, when they eventually pleaded guilty, were a quarter of a million pounds, with the fine on top. I no longer feel uncomfortable invoicing for health and safety advice because I know the value of full regulatory compliance, namely the reduced chance of criminal and civil litigation.

Westminster Briefing


Bakery ovens

It's 10am and the bakery manager and I are due to meet a 'work at height solutions provider'. The general factory risk assessments identified that cleaners were regularly climbing two to three metres up on top of the large ovens, with no safety mechanism. The salesman is all smiles initially, thinking the bakery will cough up £30K for a 'vehicle access solution.' His attitude becomes unpleasantly hostile, however, when we say that we were expecting a low-tech, low cost solution — like guard rails. The factory is due to move shortly, so we only wanted a temporary solution.

Over lunch, I have a meeting with another client about the production of a handbook on food safety. Then to Euston where I have a train to Birmingham booked for 15.10. I work whist on the train. I have been invited to give a talk next week at a 'Westminster Briefing' and I still haven't decided the subject. I'm kicking ideas when we're booted off the train. Twenty meters of copper cabling associated with the points in Birmingham New Street has been stolen. It is a long, sticky taxi ride into the centre of Birmingham.

Dinner that night is with David, a co-trainer with whom I am working tomorrow, and two members of staff from the Chartered Institute of Environmental Health, who have commissioned us. Our contract is to give talks/workshops to their registered trainers around the country, to update them in food law and practice. We did a similar update series last year after I rewrote some of their commercial training material. We reminisce about last year when I was heavily pregnant: I had the baby in the middle of the series. My husband Ron and baby travelled around the country with me so I could continue to breast feed.

Tuesday 10th June 2008: I am staying in the same hotel where we are running the day's workshop. A very civilised 8am breakfast, then to the training suite for 9am. A swathe of panic grips me and I think I have forgotten everything I'm supposed to be talking about so I spend 15 minutes frantically thumbing through my notes. I only gave the workshop in London a couple of weeks ago so I can't have forgotten that much! We have 37 on the delegate list which means we are full. It is lovely to see so many faces from last year.

We finish at 4.30pm and I paw through the evaluations to see if there is anything we can improve upon. Pleased with how the day went, I walk up to the station. Train to Euston, taxi to my car, left yesterday on the other side of London in a rather dodgy industrial estate, then down the M20 and home. I get back five hours later. Ron is waiting with a large glass of wine. The kids are in bed and I get a chance to have a chat with my father, who now lives with us in his own part

Career Path and Salary Expectations for Environmental Health Practitioners

To become an Environmental Health Practitioner requires a relevant degree or MSc, possession of an experiential learning portfolio (ELP) and successful completion of professional examinations.

Visit the Chartered Institute of Environmental Health's website for more details: **www.cieh.org.uk**

Salaries vary considerably from ca. £25K for a newly qualified local authority officer outside London, to £80K plus in the commercial sector for highly experienced independent practitioners.

of the house. My father has been a huge influence on my single-minded work ethic. In the whole of my life I only remember him having two weeks off sick with flu: he never missed another day.

Wednesday 11th June 2008: a day in the office with no visits. I have paperwork coming out of my ears, invoices to issue, bills to pay, contracts to administer, messages needing to be dealt with, emails, post etc, etc. I used to have a secretary in London but when I moved to Folkestone a year ago, I couldn't find anyone suitable locally.

My worries today are the two talks I am giving next week. I am not being paid for either but I consider them long term investments. I still can't decide what to speak about at the Westminster Briefing and I need to prepare a 45 minute talk to London environmental health officers about shelf life. The latter is relatively easy as I have just been researching shelf life determination for a Crown Court case next week. It is about a cooked meat product being used eight days past its 'use by' date and whether it should have been condemned as unfit.

Visiting a salmon manufacturer

Thursday 12th June 2008: I am up again in the dark in order to be on site 100 miles away in Stanmore in Middlesex for 6am. Ian, a manufacturer of smoked salmon, is my oldest client. I visit each month and over the last ten years we have developed pretty sophisticated food safety systems. Ian is now the proud owner of a British Retail Consortium Global Food Standard Grade A accreditation. For anyone not in the food industry, this is the gold standard enabling a food manufacturer to supply supermarkets.

On my visits I check a schedule of items for internal audit and Ian and I spend the day reviewing and updating parts of the food safety system, as well as related customer queries. We also look around the factory for issues that have arisen in the previous month. Today, Dr Ken Spears from Southbank University is visiting to discuss potential collaborations. Ken has MSc students that need project material and Ian has a practical problem that needs investigating in an academic way. Salt penetration into the salmon flesh is critical to food safety. We have designed the HACCP to require a salt in aqueous phase level of in excess of 3.5%, this will control *Clostridium botulinum*. Lab tests historically have shown that the salt in aqueous is variable, despite apparently using the same manufacturing methods from batch to batch. We are hoping that one of Ken's students can look at this in detail. The meeting is successful: I am acting as broker, I feel, but both my client and Southbank will benefit. Work complete, I am home at a very respectable 7pm.

Friday 12th June 2008: I spend the morning back in the office. A client has a chain of pie shops and I am working on a project to standardise food safety throughout the retail stores. I take the afternoon off to play with the baby and find that whilst I have been away in the week he has cut two more teeth and started walking!

Supper with all the family, a very large glass of wine and a smile that says I'm the luckiest woman in the world. I love my job — it combines science, law and being an entrepreneur. I am answerable to my paymasters — that means if they want a visit in the middle of the night they get one — but equally, they give me respect and pay well. It's not for everyone, but it is definitely for me.

Dr Belinda Stewart-Moonlight
Moonlight Environmental Ltd

MiSAC Competition 2008

John Grainger reports on the 20th Annual MiSAC competition: ***Medicines from fungi***

MiSAC is the Microbiology in Schools Advisory Committee. Its members represent a wide range of educational institutions and scientific organisations.

For further information visit: **www.microbiologyonline.org.uk/what.htm**

All the winning entries can be viewed at **www.microbiologyonline.org.uk/miswin08.html**

The topic for the **2008 MiSAC competition** was **Medicines from fungi**, special sponsorship for which was generously provided by the British Mycological Society (BMS). The aim of this year's competition, MiSAC's 20th, was to raise the level of understanding of the role of fungi in the production of medicines and in the treatment of disease through the preparation of a fact sheet for patients attending a GP practice or pharmacy. As usual, entries were invited from two age groups — Key Stage 3 (years 7-9) and Key Stage 4 (GCSE, years 10 and 11).

The strong interest shown in the competition was particularly encouraging because the study of fungi is poorly represented in examination body specifications despite the unquestionable importance of this group of microbes in food, medicine and agriculture. Some 590 entries were received, involving almost 800 students from nearly 80 schools and colleges drawn from England, Wales, Scotland and Northern Ireland – and one in Romania. As usual, Key Stage 3 (KS3) provided the larger entry group but it is encouraging to see a continuing increase in support from the Key Stage 4 (KS4) age group which this year provided about 30% of the entries.

Key Stage 3 winners

1st: **Sian Deasy**, Hounsdown School, Totton, Hampshire.
2nd: **Nadiah Fernandes**, Sheffield High School, Sheffield, Yorkshire.
3rd: **Robyn Lawrence**, Diss High School, Norfolk.
Commended: **Alice Elliott**, The Mount School, York; **Jack Linley**, Kirkham Grammar School, Kirkham, Lancashire; **Dawn Buchanan**, Edgbaston High School, Birmingham.

Key Stage 4 winners

1st: **Holly Emms,** The King's School, Ely, Cambridgeshire.
2nd: **Lizzie Vale**, St Nicholas School, Fleet, Hampshire.
3rd: **Ushna Qureshi**, Rugby High School, Rugby, Warwickshire.
Commended: **Vivek Murthy**, King Henry VIII School, Coventry, Warwickshire; **Tessa Ewart** and **Kirsten Wilson**, George Heriot's School, Edinburgh.
Commended for Creative Design: **Bea Xu** and **Sandra Fahmy**, Rugby High School, Rugby, Warwickshire

Also, the proportion of schools entering both age groups, though still small, continues to grow.

Professor Maurice Moss, University of Surrey, and Professor Anthony Whalley, Liverpool John Moores University, both past Officers of BMS, joined the Chairman of MiSAC, Dr John Grainger, and other MiSAC members for the judging at the headquarters of the Institute of Biology. Many entries impressed the judges with their high quality, good grasp of the purposes and nature of a fact sheet, aided we hope, by the guidance provided for entrants, and sound understanding of the underlying science.

The judges also looked for originality and good presentation, effectiveness in communicating science to the target audience, use of entrants' own words, (e.g. not entire text taken directly from the web) and the use of attractive and relevant illustrations to reinforce the message. This year it was also very encouraging to see an excellent level of adherence to the rules of entry, i.e. submission of a fact sheet on one side only of an A4 page and dealing with only one drug.

The special sponsorship provides prize money to winning students and their schools (see box below) and the administration costs of the competition. In addition to the prize winners, each student entrant receives a certificate, a feature which is highly valued by the schools and, therefore, worth the extra work involved for the MiSAC secretariat, provided by the Society for General Microbiology. There is also a set of microbiology teaching resources for each school and, where possible, a visit is made to the First Prize-winning schools to present prizes and certificates and, sometimes, to take a class.

MiSAC and the British Mycological Society express their sincere thanks to everyone who took part, including all those whose efforts were not rewarded with a prize this time and also the teachers who organised the preparation and submission of the entries. We hope that this was an enjoyable and rewarding experience that has led to a greater interest in microbiology.

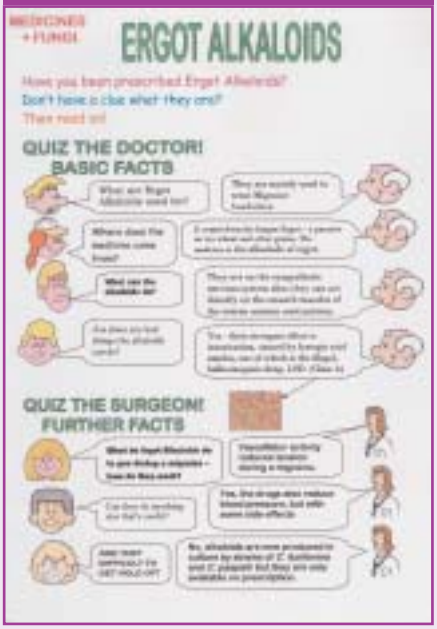
The 2009 MiSAC competition, which will fall in MiSAC's 40th anniversary year, will concern microbes and climate change, funded by special sponsorship from the Society for General Microbiology.

Prizes

Student: First £50, Second £30, Third £20.
School: First £250, Second £125, Third £70.
In addition, each student entrant receives a certificate and each school a pack of microbiology teaching support materials.

John Grainger
Chairman, MiSAC

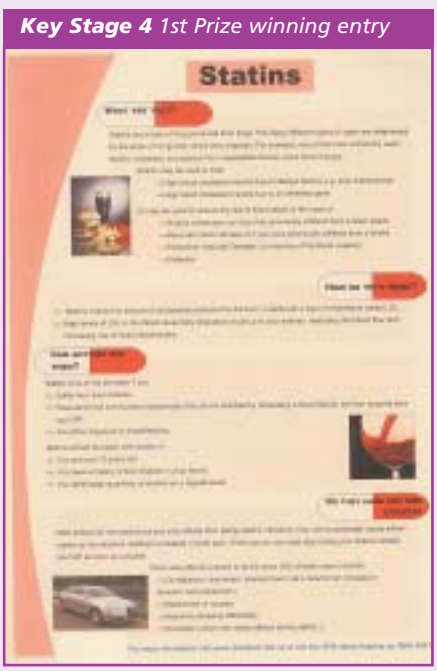
Key Stage 3 *1st Prize winning entry*



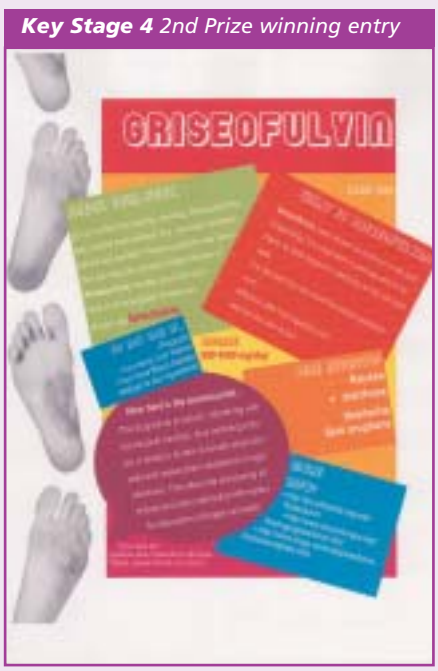
Key Stage 3 *2nd Prize winning entry*

Key Stage 3 *3rd Prize winning entry*

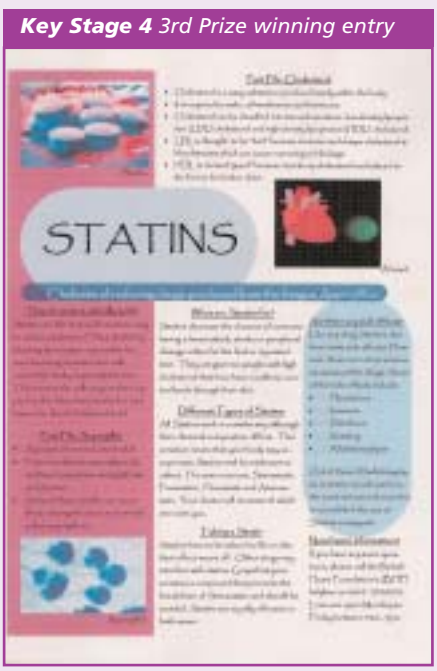
Key Stage 4 *1st Prize winning entry*



Key Stage 4 *2nd Prize winning entry*

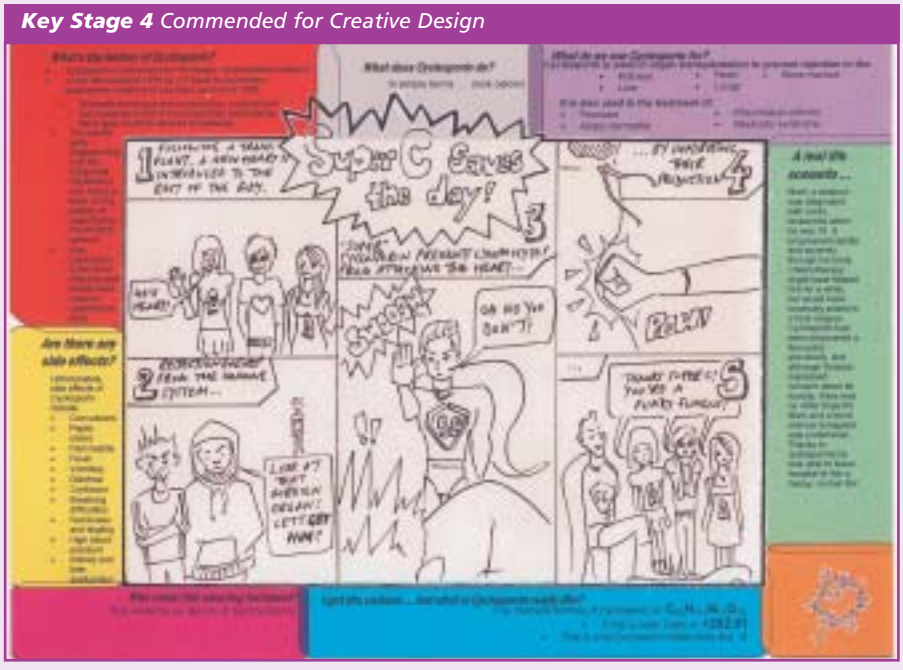


Key Stage 4 *3rd Prize winning entry*



Key Stage 3 *commended*

Key Stage 4 *Commended for Creative Design*



News from the S*f*AM Post-Graduate and Early-Career Scientist Committee

Career pathways in microbiology

The 2008 summer conference student session organised by the Postgraduate and Early Career Scientist Committee

Deciding on and planning your career can be a daunting task. It's vital to understand what opportunities exist, which skills you will need and how to 'get ahead of the crowd'. This year's student session gave an overview of some of the career opportunities in microbiology, from four members of the society who have followed very different careers pathways.

Our first presentation was given by **Mark Reed**, General Manager of Pro-Lab Diagnostics and covered careers in commercial industry. Many different roles are available including technical sales representative, sales manager, marketing manager, quality control manager, research and development scientist, technology transfer officer and production manager to name a few. The role of a technical sales representative is not 9-5, includes extensive travel, requires commitment and hard work but can be very rewarding and offer good promotion opportunities. Salaries in industry can range from £25,000 (technical sales rep) up to £50,000 (director). Mark highlighted that although you may be moving away from the laboratory into a business based environment, your knowledge of science and continued professional development will be key to your success. You need to have skills in communication and negotiation, and also be resilient, gutsy, tenacious, energetic and patient.

We then moved on hear about the role of a Clinical Scientist presented by **Andrew Sails**, Principal Clinical Scientist and Head of R & D at the HPA North East Laboratory. Responsibilities can be very varied and include laboratory work, research and development, teaching, management, budget setting and liaising with clinicians. There are three main employers (NHS, Health Protection Agency and commercial testing laboratories) and two routes into the role, the four or six year routes. The four year route is an official training scheme, while the six year route normally begins with a PhD (three years) and then comprises three years of specialised training. Both routes work towards registration with the Health Professions Council (HPC) and once registered one can progress to become a senior, principal and then consultant clinical scientist. Salaries can range from £29,000 – £38,000 (registered clinical scientist) and £52,000 – £93,000 (consultant clinical scientist). Andy described the benefits of the role which include job satisfaction, career flexibility and continued professional development.

Next **Susie Walsh**, Senior Lecturer, De Montfort University gave an overview of careers in academia. Teaching and research are two of the more obvious responsibilities, but an academic can also be involved with validating degree schemes, quality assurance for examinations, attending exam boards, admissions, timetabling and induction programmes. Promotion is based on merit and salaries range from £28,000 – £40,000. Susie discussed the 'good, bad and ugly' aspects of this work, good aspects include the satisfaction of working with young people, flexible hours, opportunities for further study and holiday entitlement. While some negative aspects can include stress and the need to multi task.

Our final talk was given by **Lucy Harper**, S*f*AM Communications Officer and focused on careers in scientific communication. Whilst working in a post doc position Lucy soon realised that she enjoyed communicating science, especially to a lay audience. She took a proactive approach and began to write and submit articles to *Microbiologist* and her university magazine. Lucy soon became the honorary editor for *Microbiologist* which led to a position as communications assistant with Med-Vet-Net and to her current role with S*f*AM. As communications officer for S*f*AM Lucy's responsibilities include writing press releases, website management, editing *Microbiologist*, chairing subcommittees and producing a monthly podcast for micropod online. To do this you need skills in communication, project management and certainly time management. Other opportunities available in scientific communication include medical writing, public engagement, editing and publishing.

Finally all our speakers gave top tips for getting ahead of the crowd, these included being enthusiastic, flexible and most importantly proactive. Get involved and gain experience of the field you're interested in, either by teaching, shadowing, volunteering, networking or attending and presenting at conferences.

I would like to thank all the presenters for giving their time; the session was a great success. See you all next year!

Vicki McCune
PECS Communications Officer, Health Protection Agency North East Laboratory

Useful resources

- www.businessballs.com
- www.aclinmicrobiol.org.uk
- www.assclinsci.org
- www.postdocjobs.com
- www.intute.ac.uk/healthandlifesciences/pscicom/
- www.stempra.org.uk/
- www.absw.org.uk/
- www.the-ba.net/the-ba/
- www.sciencemediacentre.org/pages/
- www.senseaboutscience.org.uk/

get involved

We would like to remind everyone that any contributions to this section are welcomed and can be sent to:

victoria.mccune@hpa.org.uk
gkaboagye@yahoo.com

Students into Work Grant reports

information

am I eligible - can I apply?

Yes — if you are FULL member who can offer an undergraduate microbiology student the chance to obtain work experience. If you would like to read about the experiences of Students who have benefited from this Grant, you can do so in each issue of *Microbiologist*.

For Further information visit:
www.sfam.org.uk/grants.php

Assessing the Microbiological Safety of Infant Milk Formulae

For 10 weeks during summer 2007 I worked in the new containment level 2 pathogen laboratory within the Institute of Agri-food & Land Use (IAFLU), Queen's University Belfast. Having just completed my second year of study on a BSc Food Quality, Safety and Nutrition degree course at Queen's, the *Students into Work Grant* allowed me to pursue areas of food safety and microbiology which I enjoyed during my course of study, as well as develop research and laboratory skills prior to entering my final year. Furthermore, it provided me with the possibility of using any results obtained from the research for my final year honours project.

My project focused on the possible presence of the emerging pathogens *Mycobacterium avium* subsp. paratuberculosis (MAP) and *Enterobacter sakazakii* in infant milk formulae (IMF). MAP is a pathogen of particular interest as it is known to cause Johne's disease in cattle and may also be linked with Crohn's disease in humans. A recent hypothesis has also suggested a possible link between MAP and Type II diabetes. MAP has been detected in dairy products such as milk and cheese and it has been isolated from infant milk formula in one previous study. *Enterobacter sakazakii* is a pathogen linked to IMF that can cause meningitis, bacteraemia, sepsis and necrotising enterocolitis in premature babies and infants. As infants are generally considered to have greater susceptibility to disease the investigation into the presence of MAP and *Enterobacter sakazakii* in IMF is an issue of current relevance to the food industry.

Forty-eight samples of powdered and ready-to-use IMF available for sale in Northern Ireland were tested during the course of my project. Powdered samples were reconstituted as per manufacturers' instructions and resuscitated in an incubator at 37ºC for six hours before testing, to allow any sub-lethally injured organisms to recover.

Generally growth of MAP on Herrold's Egg Yolk Media (HEYM) is considered to be the 'gold standard' test for MAP. However this method can be laborious as it requires incubation for around sixteen weeks and only detects the presence of viable cells. In order to provide a full indication of MAP presence in the IMF, two additional detection methods were employed — IS900 PCR and FASTPlaqueTB Assay (Biotec Laboratories, Ipswich). Immunomagnetic Separation (IMS) was performed to enable the isolation of MAP from background microflora of the IMF with magnetic beads coated with anti-MAP antibodies. Two different IMS methods were used, conventional IMS and the Pathatrix mini-Ultra system (Matrix Microscience Ltd, Newmarket). Subsequently, this allowed the most suitable IMS method to be identified. Following IMS, the beads recovered from each IMF sample were divided into three equal portions, which were used for the three MAP detection methods. One portion of anti-MAP beads was cultured onto duplicate HEYM slopes and incubated at 37ºC for 16 weeks. Another portion was used for the FASTPlaqueTB phage amplification assay, which was employed to give a rapid indication of any viable MAP cells present within 24 hours. The final portion of anti-MAP beads was taken through lysis and DNA extraction stages, making DNA available to test using IS900 PCR. IS900 PCR is a modern molecular method which detects any MAP DNA released from cells captured by the beads from the

IMF. To date no evidence of MAP has been obtained, although culture results are still pending.

Enterobacter sakazakii was tested for by incubation of the reconstituted milk overnight in Enterobacteriaceae Enrichment broth followed by spreading and streaking on Chromogenic *Enterobacter sakazakii* DFI agar. No *Enterobacter sakazakii* were isolated from any of the IMF tested.

During the survey I also cultured various types of bacteria, particularly *Bacillus* spp., from IMF using general purpose Nutrient Agar and classified them further using common biochemical identification techniques based on Bergey's Manual such as catalase tests, Gram staining, growth in presence of 7.5% NaCl. This aspect of the research allowed me to build upon my previous understanding regarding classification of common food bacterial species.

A particular highlight of my work placement has been the opportunity to work directly with IMS and PCR techniques and I feel privileged having worked with such modern microbiological techniques as I realise that working first-hand with these methods during the course of a normal undergraduate degree is limited.

As a result I will reap the benefits when I go into the final year of my degree having gained a greater knowledge of food microbiology research and improved practical laboratory skills. I have developed many important transferable skills such as time management, working systematically and improved problem solving ability, which will assist me in my chosen career.

I have had a great experience and I would recommend this scheme to any student who is interested in any area of microbiology or would like to gain further practical microbiology experience in the laboratory. I would like to thank my supervisor, Dr Irene Grant for sacrificing her time and providing me with expert guidance throughout my work. Finally, I extend my thanks to SfAM who supplied funding for the 10 weeks and the opportunity to benefit from such a worthwhile work placement.

Neil S Thompson
Queen's University Belfast

Detection and Occurrence of *Enterobacter sakazakii*

I spent ten weeks working at Teagasc Moorepark Food Research Centre (MFRC) in Fermoy, Co. Cork, Ireland. While at Teagasc Moorepark I had the opportunity to become involved in a project centred on *Enterobacter sakazakii* and its detection and surveillance along the infant formula food chain. It is clear that proper nutrition is of critical importance as a foundation for healthy and optimal development. Poor nutrition leads to ill health which in turn can cause a further deterioration in an infant's nutritional status. It is important that an infant's source of nutrition i.e. infant formula should be therefore free from food pathogens such as *E. sakazakii* which may jeopardise this critical time in their lives.

E. sakazakii is a gram negative, motile, peritrichous rod-shaped bacteria from the family Enterobacteriaceae and is an opportunistic pathogen. There is a recognised link between *E. sakazakii* and powdered infant formula and this has resulted in the emergence of concern in recent times. It should be noted that powdered infant formula is not a sterile product and can provide a good medium for bacterial growth. Contamination could potentially take place during processing, preparation and reconstitution of infant formula. *E. sakazakii* is rarely detected but if found can potentially pose serious health implications in premature and immuno-compromised infants. However, healthy infants are not necessarily immune to the pathogen either. Conditions which it could potentially cause include neonatal meningitis, sepsis and necrotising entercolitis. The case-fatality varies from between 40% to 80% among infants diagnosed.

For this project I swabbed various different environments. Swab samples were taken in processing dairy halls. The procedure followed consisted of: samples being taken by moistening a swab with maximum recovery diluent (MRD) and swabbing an area of approximately 3cm^2. These swabs were then transferred to buffered peptone water (BPW) and incubated at 37°C for 18h. Some of the BPW culture was then transferred into modified lauryl sulphate tryptose broth (mLST) with vancomycin. A further incubation period of 44°C for one day followed this. The cultured mLST was then streaked on the chromagenic agar DFI. The plates were incubated at 44°C again for 24h. The plates were then checked for colonies. Typical colonies are green to blue-green. Of the 300 samples tested from three different sites, only two samples were positive. These were confirmed as *E. sakazakii* by real-time PCR.

By working on this project I have gained knowledge in the area of food safety and its importance when dealing with the more vulnerable in our society. I have gained experience in the day to day workings of a research laboratory. I also had the opportunity to visit an infant formula manufacturing plant. This was very interesting as I saw first hand the running of the plant from the manufacturing of the product to the strict hygiene practices in the plant. Hygiene is of utmost importance to prevent contamination. The project allowed me to study the links between nutrition and food safety, where, from a nutritional point of view, infancy is a crucial time for the deliverance of optimal nutrition. The right balance of vitamins and minerals must be obtained. Infant formula is relied upon as a sole source of nutrition up to a certain age. Nutritionally safe food free from food pathogens will ensure the infant can thrive to reach their predetermined potential.

I would like to thank Dr Kieran Jordan for giving me the opportunity to be involved in this project, and SfAM for funding for it. I would also like to thank the staff in the laboratory for their help throughout. I am sure that the new skills that I have acquired will help me in my studies and in the future.

Bernadette Kirby

Analysis of freshwater lake ecosystems

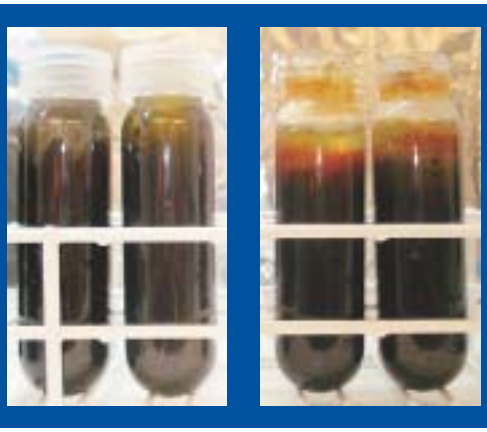


Figure 1. *Unsealed (left) and sealed (right) Winogradsky columns after 3.5 months. The sealed columns are predominantly black due to precipitation of insoluble iron (II) sulphide formed under anaerobic conditions. The unsealed tubes (membranes removed for photographic purposes) show a variety of coloured microbial layers in the upper aerated zone.*

During the summer prior to my final year studying Biological Sciences at the University of Edinburgh I was given the opportunity to gain valuable laboratory experience by participating in an eight week project with Dr Rosalind Allen and Dr Andrew Free. The project involved molecular analysis techniques to facilitate the understanding of the development and function of a microbial ecosystem. This knowledge is relevant to pollution, climate change and species loss. In this project we analyzed self-sustaining freshwater lake ecosystems (Winogradsky columns) which had been created three or four weeks and three or four months before the project began. Winogradsky columns are self-sustaining ecosystems which are driven by an initial supply of nutrients and sustained by light energy and networks of metabolic interactions amongst organisms in the column. A Winogradsky column contains great diversity of Bacteria and Archaea, as well as eukaryotic microbes. Over several weeks after the column is set up, microbial species self-organise into horizontal layers and stable oxygen and sulphide gradients emerge.

In this project, columns were constructed using perspex tubes ranging from 10 cm to 30 cm in height. The bottom of each tube was filled with sediment from Blackford pond in Edinburgh, which had been sieved and mixed with cellulose, calcium sulphate and calcium carbonate. Water from the pond filled the top of the tube. Some of the columns were capped to prevent oxygen from entering; others were covered with a membrane to allow gas exchange. They were then placed in a cupboard containing strip-lighting and incubated for 3.5 months in the case of the tubes created on 15th February (Group 1), and 2 weeks for the tubes created on 20th June (Group 2).

The most common method of determining the microorganisms present in microbial ecosystems is by analysis of 16S rRNA genes. Although Winogradsky columns have been around for approximately 100 years, previous analysis has used only standard laboratory techniques such as microscopy. The purpose of this project was to characterise microbial diversity in this system using modern techniques.

The initial part of my project involved observing the columns and noting differences between them. There were obvious differences in colour between the anaerobic sealed tubes and the aerobic unsealed tubes as shown in Figure 1. To characterise the columns, sediment samples were taken from the columns, and DNA was extracted using a DNA extraction kit. Following the DNA extraction, polymerase chain reaction (PCR) was carried out to amplify 16S rRNA genes.

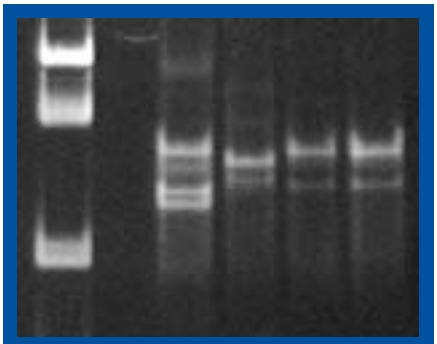


Figure 2. *DGGE analysis for Archaeal Samples. 1: Sealed, group 1 (3.5 months old); 2: Unsealed, group 1 (3.5 months old); 3: Sealed, group 2 (2 weeks old); 4: Unsealed, group 2 (2 weeks old)*

DGGE

To obtain fingerprints of the species present in the PCR samples, Denaturing Gradient Gel Electrophoresis (DGGE) was used. This technique recognises single base changes in DNA fragments of the same length by running them on a polacrylamide gel containing an increasing gradient of denaturant. The gradient is composed of urea and formamide and as the gradient increases (from 20-80%) through the gel, the melting of the DNA increases. Since the rate of melting is dependent on DNA sequence, and partially melted fragments migrate slower, this creates different bands for different sequences. Fragments of 16S rRNA genes from Archaea were obtained by nested PCR and the products were run on a DGGE gel. Figure 2 shows that there is a significant difference in the species composition of the unsealed and sealed samples created from the Group 1 (older) columns, however sealing the columns has not had a great effect on the Group 2 (younger) columns. There is also a notable difference between the Group 1 and Group 2 columns, showing that species composition changes as the columns develop.

RFLP

Restriction fragment length polymorphism (RFLP) involves the use of restriction enzymes to cut DNA at specific recognition sites. If the sequence variation add or removes recognition sites, the resulting fragments of different lengths can be detected on a gel. In this project we

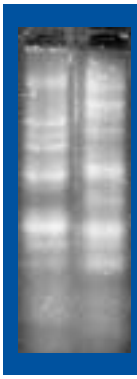


Figure 3. *RFLP analysis for Bacterial samples. 1: Group 1 (3.5 months old), unsealed; 2: Group 2 (2 weeks old), unsealed*

used two enzymes which we knew would cut frequently within 16S rRNA genes: *Hae*III and *Hha*I. After digestion with these enzymes, the fragments were then separated on a 3% agarose gel by electrophoresis. Bacterial PCR products from an unsealed Group 1 column and an unsealed Group2 column were used. The results in Figure 3 show significant variation in species composition between the Group 1 and Group 2 columns, again demonstrating that species composition changes with age of the column.

CLONE LIBRARY

In order to determine the major species present in the columns, a small clone library was constructed using the amplified rRNA gene fragments from an unsealed Group 1 (3.5 month old) column. They were ligated into a pCR 2.1 vector and then transformed into competent cells. Positive transformations were identified on plates containing kanamycin and X-gal. The positive clones were white (self-ligated vector gives blue colonies). Five white colonies were purified and sequenced from the Bacterial and Archaeal clone libraries. The results of the Archaeal sequencing reaction showed that all clones were uncultured methanogens which had a sequence similar to *Methanosaeta*, an obligate anaerobe which converts carbon dioxide or acetate to methane gas. The results of the bacterial sequencing reaction gave four sequences similar to *Clostridium* spp. *Clostridia* are anaerobes that degrade cellulose, which is significant as we added cellulose to the columns at the start of the experiment. One of the clones gave a sequence suggesting a sulphate reducer related to *Desulfovibrio* which was also significant because calcium sulphate was an added nutrient.

This project has not only given me invaluable laboratory experience using techniques such as DGGE which I had only read about before, but also the ability to organise and manage various procedures in the lab. I would like to thank S*f*AM, Dr Andrew Free and Dr Rosalind Allen for giving me the opportunity to work in a professional lab, and for inspiring me to continue my career in microbiology research.

Dr. Rosalind Allen and Dr. Andrew Free are very grateful to S*f*AM for supporting this project, and would also like to thank Amanda for all her hard work, perseverance and enthusiasm. We also thank Professor Jim Prosser for very useful discussions and Professor Fergus Priest for loan of the DGGE apparatus.

Amanda McNeil
University of Edinburgh

information

am I eligible - can I apply?

If you often find difficulty in funding attendance at meetings. It is not only our student members who require our help. Senior microbiologists often find difficulty in funding attendance at meetings. If you are in this position you are eligible for this fund.

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President's Fund reports

xMAP technology for the detection of foodborne pathogens

Infectious intestinal disease (IID) is a major public health burden, causing significant morbidity and economic cost to the UK. It has been estimated that 9.4 million cases occur annually in England (Wheeler *et al.*, 1999), with around 26% resulting from foodborne transmission routes (Adak *et al.*, 2002). Foodborne disease (FBD) is defined as 'disease due to the consumption of food contaminated with microorganisms or their toxins' (Anon, 2000). Numerous bacterial, viral and parasitic microorganisms have been documented as causative agents of FBD and currently *Campylobacter* species are the most common cause in England and Wales. When morbidity, mortality and health service usage are considered, *Salmonella*, *Campylobacter*, verotoxigenic *Escherichia coli*, *Clostridium perfringens* and *Listeria monocytogenes* are the most important pathogens in terms of disease burden (Adak *et al.*, 2002).

In 2000 the Foods Standards Agency announced its goal to reduce FBD in the UK by 20% and to date has documented a 19.2% decrease (Anon, 2006) in the incidence of FBD. Laboratory detection and identification of foodborne pathogens plays a crucial role in identifying contaminated food sources, allowing for effective prevention and control strategies to be implemented. Culture and phenotypic identification is the 'gold standard' for the detection of bacterial pathogens from foods and currently is the method of choice in our laboratory. Culture methods are inexpensive and can provide both qualitative and quantitative results, unfortunately they are also time consuming and laborious involving multiple enrichment, culture

and phenotypic tests which require several days to complete. Robust rapid alternative methods would enable early detection of pathogens and the timely withdrawal of contaminated foods from food supplies, thus helping to reduce the exposure and incidence of foodborne disease.

Since its development in 1983 the Polymerase Chain Reaction (PCR) has become an invaluable tool in microbiology and is now used routinely in clinical diagnostic laboratories. PCR is more rapid and can offer increased specificity and sensitivity in comparison to conventional culture. Numerous PCR-based methods for pathogen detection have been developed and many utilise gel electrophoresis as an end point detection technique. However gel electrophoresis is itself time consuming and lacks sensitivity. Real-time PCR approaches offer the advantage of a rapid closed tube system with no need for post PCR analysis; but due to the overlapping spectra of the fluorescent dyes used, this technique is limited in multiplex capacity. By combining PCR with xMAP microsphere technology, multiple PCR products can be detected simultaneously in one reaction vessel, which reduces time, labour and cost.

xMAP microspheres are the proprietary technology of Luminex, a Texas based company and are used in suspension arrays, where they provide a solid surface on which a detection reaction is performed. The microspheres are 5.6 μm polystyrene beads internally dyed with a specific concentration of two fluorochromes, giving them a distinct spectral emission profile. There are currently 100 different microsphere sets available, each spectrally distinct from one another, allowing for the simultaneous detection of up to 100 different target molecules (Dunbar, 2005). Target molecules can include antibodies, antigens, DNA, RNA, enzymes and ligands and are detected via their reaction with a capture molecule bound to the microsphere surface. Pathogen specific PCR products can be detected by direct hybridisation to DNA probes on the microsphere surface. The microspheres are analysed in a dual laser flow cytometry-based array reader, where a biotin-streptavidin reaction verifies the presence of PCR products. As part of my PhD studies I am developing a PCR-microsphere array for the detection several foodborne pathogens. The assay will allow foods to be screened for several pathogens in a rapid multiplexed format, complementing our existing methods.

I would like to thank S*f*AM for their generous award from The President's Fund, which funded a research visit to the Salmonella Reference Laboratory, Centers for Disease Control and Prevention (CDC), Atlanta. Recent work at the CDC has focused on the development of a molecular serotyping assay for *Salmonella* using xMAP microsphere technology (Fitzgerald et al., in press). During the research visit I had the opportunity to share research ideas and methodologies with scientists at the CDC and I was able to participate in a molecular serotyping workshop, hosted by the Salmonella Reference Laboratory. During the workshop I gained knowledge of *Salmonella* taxonomy, the Kauffmann-White scheme, the genetic basis for molecular serotyping and more importantly how they have utilised xMAP technology in their serotyping application. I was also able to network with public health professionals from across America and discuss potential collaborative work.

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Victoria McCune
Health Protection Agency North East Laboratory

Environmentally friendly decontamination of *Bacillus anthracis* spores

Bacillus anthracis **belongs to a** group of genetically related organisms for which the formation of an impervious spore represents a key survival strategy. The spore confers considerable resistance to chemical and thermal insult, properties which underpinned the development of *B. anthracis* as a biological weapon and pose a considerable challenge to clean up operations following a natural or illicit release (Baillie, 2005).

Decontamination modalities currently require the use of toxic biocides such as formaldehyde, chlorine dioxide and hydrogen peroxide or gamma radiation (Anon, 2005). There is an urgent need to develop environmentally friendly decontamination strategies that can be applied to a range of environments such as public buildings, mass transit facilities or open air urban sites with little or no toxicity to fauna or flora and are cost effective (Anon, 2005).

In response to this need we are developing an approach which combines the ability of a simple mixture of amino acids to trigger spore germination with *B. anthracis* specific bacteriophages which selectively infect and kill the vegetative organism. This approach is based on the premise that addition of germinants to soil artificially contaminated with anthrax spores will stimulate the organism to convert from a chemically resistant spore to a chemically sensitive bacterium which can be killed by bacteriophages. These viruses represent the most abundant form of life in the biosphere. Soil contains on average 1.5×10^8 g-1 of phage, and they play an important role in controlling bacterial populations (Ashelford *et al.*, 2003).

While anthrax-specific lytic phages such as the gamma phage and AP50 have been isolated and are used routinely as diagnostic and molecular biology tools, resistant isolates have been reported (Abshire *et al.*, 2005). To counter the possibility of selecting for a phage-resistant sub-population of *B. anthracis* Theresa Gallagher at the University of Maryland Biotechnology Institute in Baltimore has been developing a cocktail of lytic phages

which will target different bacterial receptor sites thus reducing the likelihood that a resistant mutant will emerge. To achieve this aim we have isolated lytic bacteriophages such as 3B6 from a range of soil samples obtained from locations from across the State of Maryland by seeding log phage cultures of the avirulent Sterne vaccine strain of *B. anthracis* with untreated soil and screening for lytic activity on an indicator strain (see figure 1).

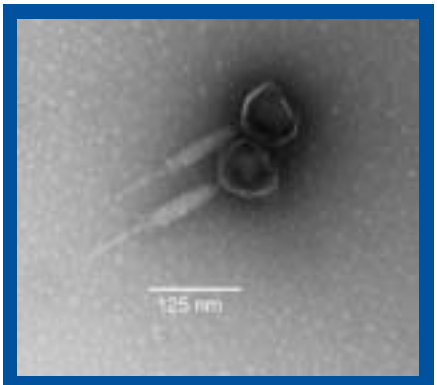

Figure 1. *Electron micrograph (Magnification x80,000) of the anthrax lytic phage 3B6 isolated from soil taken from a river bank in Columbia, Maryland, USA.*

To determine if we could remove *B. anthracis* spores from contaminated soil we seeded sterile (autoclaved) soil taken from the same site from which the 3B6 phage was isolated with an exponential culture of the Sterne strain of *B. anthracis*. Following five days incubation at room temperature the majority of the vegetative organisms had converted to spores with a total spore count of approximately 10^6 cfu g^{-1}. Previously we had shown that the addition of a germination mixture comprising 300mM L-Alanine, 15mM Inosine, 30mM NaCl and 30mM NaH_2PO_4 (pH 7.2) to spore laden soil resulted in a >3 log reduction in spore load as a consequence of germination (data not shown) in contrast treatment with Phosphate Buffered Saline (PBS) had no effect (Clements & Moir., 1998).

Conversion to vegetative organisms is short lived with the majority of organisms reverting to spores within 48 hours of treatment. To determine the ability of lytic phages such as 3BG and the gamma phage to kill newly germinated organisms we treated spore laden soil microcosms with a mixture of phage (final concentration 108 pfu g-1) in combination with PBS or germinant. To determine if we could increase the period during which the bacteria were present as vegetative organisms and thus potentially susceptible to phage mediated killing, we treated the soil a second time (48 hrs later) with either germinant or PBS.

While treatment with PBS and phage had no effect on spore load (data not shown) the combination of germination with phage resulted in a significant reduction in spore numbers (see figure 2). The environmental isolate 3B6 proved to be as effective at killing vegetative organisms as the gamma phage. Similar results were obtained using soil leachate (data not shown). The observation that a second treatment with germinant failed to significantly reduce the viable count could be due to a number of reasons; the remaining bacterium may be unable to germinant under these conditions, the level of free phage at this time may be insufficient to lyse the additional bacteria or that the residual organisms represent phage resistant isolates.

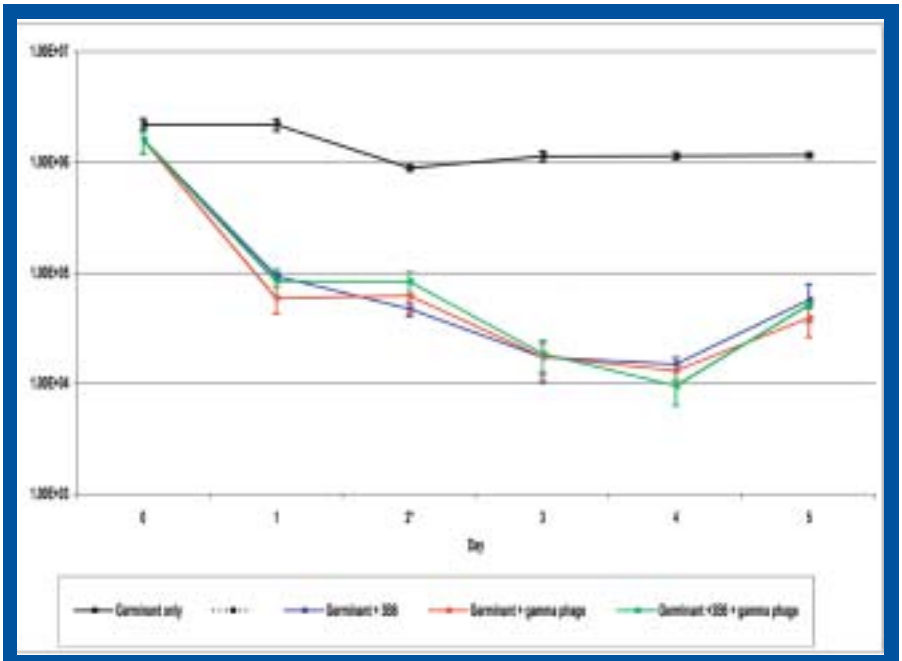

Figure 2. *Treatment of B.anthracis spore laden soil with a mixture of phage and germinant. Error bars represent the mean ± standard deviation, n=3. Second treatment with germinant (*).*

In conclusion, environmentally friendly decontamination strategies which inactivate spore formers such *B.anthracis* and *Clostridium difficile* would be of immense benefit in controlling the threat to health posed by these pathogens. Using a simple mixture of amino acids we have demonstrated the feasibility of converting resistant spores to biocide and phage susceptible vegetative organisms thus reducing the concentration of toxic agents required to clean up after an incident. Bacteriophages in combination with germinants is a promising strategy for the remediation of spore contaminated environments.

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Les Baillie
Cardiff University

corporate news

The latest news, views and microbiological developments from our corporate members

VLA to offer new phenotyping services

The Veterinary Laboratories Agency (VLA) is an internationally recognised centre of excellence in veterinary research with close links with research institutes and universities globally. The VLA provides a National and International Reference Laboratory service for a wide range of animal diseases and zoonoses. Research into and diagnostic development for veterinary pathogens using the latest technologies for genotypic and phenotypic analysis are our key remits.

In conjunction with exciting DNA based array technologies, the VLA will shortly launch a new Phenotype Service based on the Biolog Omnilog Microarray platform. VLA has been working closely with Biolog's UK distributor, TechnoPath, and has built up an extensive experience of using the unique Biolog Phenotype MicroArray system for a wide range of microorganisms. Just as DNA Microarrays and Proteomic Technologies have made it possible to assay the level of thousands of genes or proteins all at once, Phenotype MicroArrays make it possible to quantitatively measure thousands of cellular phenotypes.

These new services will be launched in collaboration with TechnoPath at an event to be held at VLA's Weybridge headquarters on 12 November 2008.

further information

visit: vla.defra.gsi.gov.uk
For further information on the launch event please contact: **Jean Barker**,
Email: j.barker@vla.defra.gsi.gov.uk
Tel: +44 (0)1932 357302)
On the new service contact **Professor Martin Woodward**
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Environmental Sampling That Really Counts!

Effective environmental sampling can be obstructed by the remaining traces of disinfectants and sanitisers used for cleaning. The surviving bacteria can be protected within a surface biofilm, but when removed by swabbing are immediately exposed to the biocide and killed, and so are not detectable by culture. It is important to first moisten the swab with a neutraliser which will cancel out the effect of the biocide and allow proper recovery and accurate enumeration of those live bacteria present at the test site.

This task is simplified by **NRS Transwabs® from Medical Wire**. Each swab is supplied with its own tube of 5ml or 10ml (accurate to within 2%) of neutralising rinse solution (NRS) used to wet the swab prior to sampling, and act as transport tube for submission to the laboratory. NRS solution complies with ISO 18593:2004, contains lecithin, Tween™80 and sodium thiosulphate and will neutralise most disinfectants used in the food industry. Both tube and swab come with a specially "winged plug" to ensure no leakage before or after use, and with blue caps and shaft for visibility.

further information

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New medium for presumptive *E. coli* enumeration in milk

Lab M's new Modified Lauryl Sulphate Tryptose Broth with MUG & Tryptophan (ISO) is designed for the presumptive enumeration of *Escherichia coli* from milk and milk products using the Most Probable Number (MPN) technique according to ISO 11866-1:2005. The key to *E. coli* enumeration is the addition of 4-methylumbelliferyl-β-D-glucuronide (MUG) to the standard Lauryl Tryptose broth formulation.

Used in conjunction with the Most Probable Numbers (MPN) technique, Modified Lauryl Sulphate Tryptose Broth with MUG & Trytpophan (ISO) allows presumptive *E. coli* to be enumerated from presumptive coliforms. The addition of MUG allows the positive discrimination of *E. coli* strains. The majority of *E. coli* produce β-glucuronidase enzyme which enables them to hydrolyse MUG, resulting in the release of a fluorogenic compound. Tubes which fluoresce under UV light are confirmed for *E. coli* by a positive indole reaction when Kovac's reagent is added to the tube.

Modified Lauryl Sulphate Tryptose Broth with MUG & Tryptophan (ISO) is described in ISO 11866-1:2005 and is used in the HPA National Standard Method D5 for Enumeration of coliforms and presumptive *E. coli* by the Most Probably Number (MPN) technique.

further information

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information

Are you a corporate member of the Society? If so, this section of *Microbiologist* is for you. Here you can publish short press releases, acquisition notices, news of new staff appointments, technical developments and much more.

Each corporate member of the society may publish ***up to*** 200 words on a topic related to their field of activity in each issue of *Microbiologist*. For further information please contact Lucy Harper by email at: **lucy@sfam.org.uk**

Both corporate members and ordinary members of the Society will find a wealth of useful information and resources in this section.

Plastiques GOSSELIN launches new range of bottles

Octagonally shaped, these bottles are intended for water sampling and food application and are manufactured in France. These new GOSSELIN bottles will meet all your requirements in terms of both cost and quality. They are intended for the packaging and storage of culture media, buffers, liquids & powders.

Main features:

- Unbreakable
- Neck inside diameter : 31.7 mm
- All models are graduated : 125 ml (every 25 ml), 250 ml, 500 ml and 1 L (every 50 ml),
- Natural, red or blue tamper-proof screw cap
- Aseptic or ionised (10 kGray)
- Easy handling
- Ideal for flat storage
- Excellent tightness

These bottles are in compliance with standards NF EN 13972, the Directive 94/62 EC, the EC Regulation N° 1935/2004.

Water sampling range:

Made from material compatible with food applications, the range is made up of volumes of 250 ml, 500 ml and 1L. The ionised products can be supplied with or without thiosulfate.

Food range:

Made from material compatible with food applications, the range is made up of different volumes: 125 ml, 250 ml, 500 ml, 1 L.

further Information

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Neogen offers a wide variety of food and feed safety testing products

Neogen's diagnostic test kits are easier to use, provide greater accuracy, sensitivity, speed and are better value for money than many of the testing methods currently employed.

Spoilage bacteria testing

The Soleris system rapidly detects microbial contamination by monitoring the colour changes produced by changing pH, and other reactions, generated by microbial growth. The automated optical system needs only a fraction of the time of traditional methods, with significantly less hands-on time. The Soleris system offers a wide array of rapid tests, including: total viable count, coliforms, *E. coli*, yeast and molds, lactic acid bacteria, and *enterobacteriaceae*.

Food-borne pathogen testing

Neogen's Reveal® line of lateral flow microbial tests for *E. coli* O157:H7 and *Salmonella* allows users to quickly and accurately screen samples for these pathogens. Reveal for *E. coli* O157:H7 utilizes Neogen's proprietary media to screen samples for this pathogen in as little as 8 hours.

GeneQuence®'s automated DNA probe technology allows for the rapid and extremely accurate processing of samples for *Salmonella, Listeria* spp., and *Listeria monocytogenes*.

Neogen products also include Acumedia® premier dehydrated culture media, which is available both in high volume blends and smaller custom lots.

further information

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Prolab Mucolyse

Mucolyse (PL701), from Pro-Lab Diagnostics is a liquefying agent to digest and thin out sputum samples prior to laboratory processing and isolation of potential pathogens.

Mucolyse presents an effective sputum digestant in a simple, convenient, economical format. Dithiothreitol and phosphate buffer are lyophilised in accurate quantities, each vial is reconstituted with 10ml of sterile distilled water then to 100ml of active solution. The resultant ph of Mucolyse is 7.0, has no effects on the morphology or growth of potential pathogens in samples. Presented as 10 Vial Packs. Samples on request.

Immersion Oil (PL396) - The study of cells and cellular structure using standard light microscopy is limited in terms of magnification. In microbiological microscopy this is improved with the use of oil immersion lenses offering magnification up to x1000 for bacterial cells, protozoa, fungal elements etc. The use of immersion oil with the same refractive index as glass used in the manufacture of glass microscopy slides, increases the resolution between the oil immersion lens and the specimen slide by replacing the air between the lens and the slide easing the spread of light at the same speed as in glass, hence avoiding image distortion. 50ml Samples on request.

further information

visit: www.pro-lab.com
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New microbiology imaging software offers fast, accurate analysis of colony numbers and zone sizes

Synbiosis has introduced its new ProtoCOL V1.4 colony counting and inhibition zone sizing software.

The software is built for maximum flexibility and can be used to analyse images of the same or different coloured colonies on pour, spiral or surface inoculated plates and 3M™ Petrifilm™, as well as measure inhibition zones on Single Radial Immunodiffusion (SRD) plates, and around antibiotic disks.

The ProtoCOL V1.4 software is Good Laboratory Practice compliant and supports 21CFR Part 11. It features many innovations for measuring zone sizes, including a gantry control system to allow microbiologists to automatically image large SRD plates. The software also measures inhibition zones from the edge of an antibiotic disc, and automatically subtracts disc diameter sizes to provide results as a zone size only. This not only saves manual calculation time but also permits scientists to perform tests with different antibiotic disc sizes on one plate. The zone size results are automatically transcribed into Excel, and either an antibiotic or vaccine name can be entered into the database, which means it is easy to produce a full, secure audit trail for each specific therapy.

further information

visit: synbiosis.com
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Whitley workstation versatility

Although we consider ourselves innovative at Don Whitley Scientific, some of our customers are particularly creative with their Whitley Workstations. Certain applications do require that a workstation be tailored to create the ideal set-up for a particular line of work. Fortunately, the Whitley range of anaerobic and microaerophilic workstations is ideal for this, being modular, manufactured in the UK, and having a range of options and accessories.

Some of the more ***usual*** options purchased from us include additional built-in power sockets; twin airlocks; bespoke shelving; integral microscopes; and trolleys.

Other customers, however, have more individual needs and these are just some of the unusual applications where a Whitley Workstation is being used:

- One food laboratory customer requested an integrated refrigeration unit on their Whitley VA500 with airlock. This enables them to store food samples and transfer them directly to the workstation for analysis.
- One Sheffield customer required a range of individual incubation boxes inside their workstation to enable them to utilise different gasses in their experiments.
- Another customer requested that his workstation was divided in half with a sliding door mechanism. In one side they were able to maintain an ambient temperature and the other side could be used as an incubator.

Further information:

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New microbiological methods manual from CCFRA

A new edition of CCFRA's Manual of microbiological methods for the food and drink industry (CCFRA Guideline No. 43), used widely by food industry microbiology laboratories, is now available. This, the fifth edition, contains 10 new methods, while many of the existing 58 methods have been updated to take account of recent developments and feedback from their practical use.

Chris Baylis, who edits the manual, explains: "The methods themselves, which cover the detection, confirmation and enumeration of a range of established and emerging pathogens and spoilage organisms, are fully consistent with CLAS (Campden Laboratory Accreditation Scheme) and will also be of use to companies seeking UKAS (United Kingdom Accreditation Service) accreditation. Flow diagrams provide an at-a-glance overview of each method, which is presented in a standard format which specifies the scope, principle, media and reagents, apparatus and procedure, and results interpretation. References point to valuable additional information such as validation studies and British Standards."

further information

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Launch of New Mast Website

The new version of the Mast website, **www.mastgrp.com** is now online.

Mast has listened carefully to feedback from the previous site and implemented many additional features on the new site.

We have made product documentation easier to access, with Material Safety Data Sheets (MSDS) product literature, pack size and product status information all provided on the specific product pages, without the need to complete time-consuming registration forms.

Instructions for Use (IFU's) are also available to view online, with visitors having the option of being updated of any amendments as and when they occur. Registered users also have access to additional features and the site is now easier to navigate. The search facility permits product searches of the infectious agent, the type of technology, application used or the disease caused, in addition to product name, brand name, or the specific product order code. Visitors are made aware of new developments and product launches with the most recent news items depicted on the home page, as well as in the NEWS section.

Mast believes this new format website will enhance the visitor's experience and provides a suitable framework on which we will continue to build, to ensure all customers are kept fully aware of Mast's capabilities.

further information

visit: www.mastgrp.com
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Culture Media Complies with Microbial Limit Tests from Ph. Eur. USP and JP

Oxoid has introduced a complete portfolio of culture media for the microbiological examination of non-sterile pharmaceutical products, as recommended in the Harmonised Microbial Limit Tests chapters in the Ph. Eur, USP and JP.

The fully validated portfolio (validation documents available on request) includes Oxoid and Remel brand dehydrated culture media and prepared media for both microbial enumeration tests and specific micro-organism testing.

"Rigorous quality assurance and quality control systems ensure that our media meet the technical specifications and regulatory standards that pharmaceutical microbiologists require," commented María Higgins, Oxoid. "Our carefully sourced raw materials are fully traceable. Quality control is performed quantitatively and qualitatively, using the recommended strains and incubation/temperature parameters outlined in the harmonised MLT chapters of the Ph. Eur, USP and JP. Pharmaceutical companies can therefore have complete confidence in our portfolio."

Oxoid and Remel media are produced utilising state-of-the-art equipment and controlled environments to ensure consistent, high-quality products made to international standards. On-site inspections and audits are welcome.

The complete range of the specified ATCC® microbial strains recommended by the harmonised MLT chapters of the Ph. Eur, USP and JP are also available as Oxoid Quanti-CultPLUS™ and Oxoid Culti-Loops™.

further Information

visit: www.oxoid.com
Tel: + 44 (0)1256 841144
Email: oxoid.pharma@thermofisher.com

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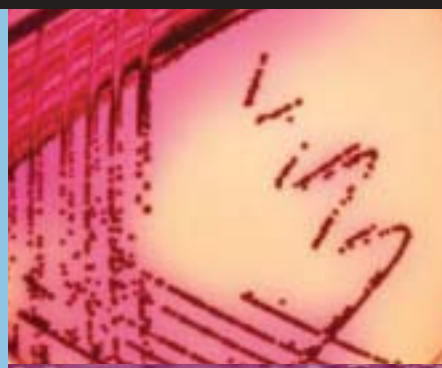
BD Diagnostics
21 Between Towns Road
Cowley
Oxford OX4 3LY
Tel: 01865 781677
Fax: 01865 781528
www.bd.com

Complete Media Assurance

Culture Media for Harmonised Microbial Limit Tests (Ph. Eur, USP, JP)

Oxoid have the full range of culture media for the microbiological examination of non-sterile pharmaceutical products:

- Criiv s^ifa^qba ^``loafkd ql qeb e^oj lkfpba JlQ jbqelapfk the Ph. Eur, USP and JP
- S^ifa^qflk m^`h^db ^s^fi^_iblk obnrbpq
- @ljmibqb o^kdb clo jf`ol_f^ibkrjbo^qflk ^kaqbpqpclo specified micro-organisms
- Nr^ifqv @lkqolqbpqba rpfkd ob`ljjbkaba pqo^fkp



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DEDICATED TO MICROBIOLOGY

To find out more contact:

Oxoid, Wade Road, Basingstoke, Hants RG24 8PW

Tel: +44 (0) 1256 841144
Fax: +44 (0) 1256 329728
Email: oxoid.pharma@thermofisher.com
www.oxoid.com