Microbiologist

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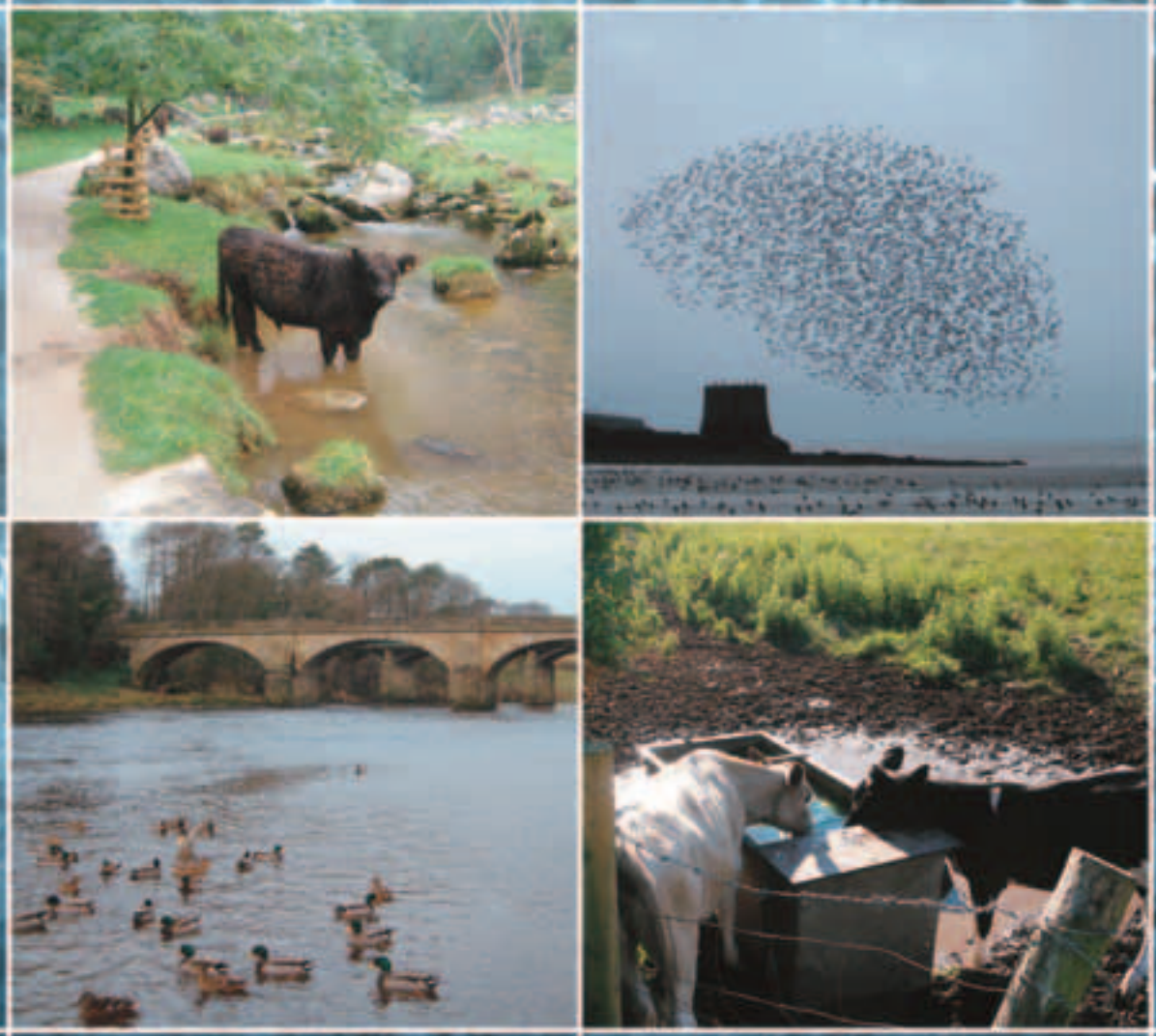

Campylobacter: is there a water connection?

INSIDE

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Microbiologist the magazine of the Society for Applied Microbiology

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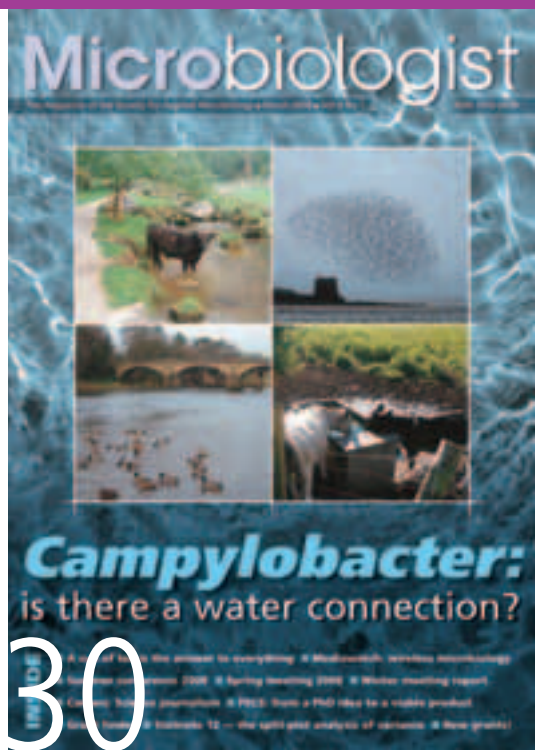

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editorial

Lucy Harper explores the developing world of interactive online networking

In my last Editorial I spoke about the facets of new technologies and social media. I know that a number of you have now signed up to the SfAM Facebook group. I hope you're finding the regular updates useful, and if there is anything you'd like to see on this page then please feel free to send me your ideas. Do keep a look out for additions to the group — and don't forget, you can add comments to the wall, start a discussion topic, or send me any photographs you think would be of interest to the group and I'll upload them on to the page.

Continuing the theme of social media, on 17 December 2007, a new media portal was launched as a joint initiative with the Society for General Microbiology (SGM). ***Micropod online*** is a new technologies portal brimming with news, views, information and fun - all with a microbiological theme. There are news stories, blogs, podcasts and micropod **also** has a Facebook group. Join this group and receive reminders whenever a new podcast is uploaded. We'll also let you know when the blogs have been updated so you can have a read and then have your say. Developed by myself (Lucy H) and Lucy Goodchild (Lucy G) of the SGM, this new website was launched with the theme: the microbiology of Christmas. In January, we looked at hygiene and cleanliness, discussing the ever-unpleasant Norovirus and the sometimes controversial topic of hospital acquired infection. February's episode looked at the delicate area of sexually transmitted infections and included an interview with SfAM Treasurer, Professor Valerie-Edwards-Jones about her appearance on the Channel 4 TV series 'Embarrassing Illnesses' (see page 10 for details).

December also saw the launch of the SfAM Communications Award. If you know of a deserving nominee for this prestigious award, then don't forget to send in your nomination before **11 April 2008** to be in with a chance of hearing your nominee make the after dinner speech at the SfAM Summer conference 2008 (see page 12 for details or visit www.sfam.org.uk/grants).

The theme of the SfAM Summer conference this year is the *'Microbiology of Water in Work, Rest and Play.'* This is a particularly topical area — the 22 March 2008 is the 14th World Water Day and as I write this Editorial, I've just heard about the temporary closure of a swimming pool in Lanarkshire, Scotland after a man was admitted to hospital with Legionnaire's disease. The role of water in the transmission of pathogenic bacteria forms much of the programme for the SfAM Summer conference (see page 26 for the full details). One such pathogen which is not automatically associated with water is *Campylobacter* and this forms the topic of the first feature article of this issue of *Microbiologist*: *Campylobacter* and water (see page 30). Remaining on a watery theme, one might consider a quote from the well know *'Rime of the Ancient Mariner'* by Samuel Taylor Coleridge, *'Water water everywhere, nor any drop to drink.'*

However, drink is abundant in our second feature article which describes some interesting facts about components of tea and their ability to inhibit the *in vivo* activity of the lethal toxin of *Bacillus anthracis*. So, turn to page 34, put the kettle on, put your feet up and enjoy this issue of the *Microbiologist* over a nice cup of tea.

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 advertisements 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.

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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:

- Many generous grants and awards
- Substantially reduced rates for attendance at Society meetings and conferences
- Access to the members areas of the Society website
- FREE access to four acclaimed journals

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 from the members area. Look out for many new grants to be launched very soon.

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 Blackwell Publishing in the monthly journal *Environmental Microbiology* and we are launching a new journal for 2008; *Microbial Biotechnology*.

Synergy is an online service provided by Blackwell Publishing 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 register for this service at http://www.blackwell-science.com. Members can also submit papers directly to our journals via an online submission service. For more information about Synergy or online manuscript submission, please visit the website.

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 occasional 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*, other, exclusive *Sf*AM 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

spot the **difference!**

microbreak

On the right are two versions of a photograph of the Society Stand taken at the Winter Meeting held in London in January 2008.

See if you can spot the **ten differences** between the two photographs, then ring the differences on **picture 'B'** and send this page (or a photocopy) to the Editor at the Society office no later than **Friday 4 April 2008** and you'll be in with a chance of winning a prize!

Suggestion: if you have a scanner, scan your entry at 300dpi (pixels per inch) at actual size and email it to the Editor at: **lucy@sfam.org.uk.**

president's column

Margaret Patterson talks about the many benefits of Society membership

Many of you will have recently renewed your S*f*AM membership for another year. Some of you may not have renewed your 2008 membership yet — perhaps because you simply forgot or perhaps you are not sure if you can justify the cost of renewing. Others reading this will have just joined the Society for the first time. Whatever your position, I thought it would be worthwhile reminding you of the benefits of being a S*f*AM member, particularly highlighting some recent initiatives and to encourage you to take full advantage of being part of the Society.

The key benefits of S*f*AM membership are highlighted in the table below.

Free online access to our journals

All Full Ordinary and Student members are able to access our journals online for free — the *Journal of Applied Microbiology*, *Letters in Applied Microbiology* and *Environmental Microbiology*. In addition, from January 2008 members have also been able to access a new journal — *Microbial Biotechnology*. When you first join the Society you will be given a password to allow you to activate your online access. If you have not received this information, or you are having problems gaining online access. please contact Julie Wright, our Membership and Finance Co-ordinator: julie@sfam.org.uk.

Access to grants and awards

The Society has a wide range of generous grants and awards. Our most popular grants continue to be the **President's Fund** (worth up to £1,000) to assist members to travel to any relevant conferences around the world and the **Students into Work Grant** (worth up to £2,100) to allow members to employ undergraduates for up to 10 weeks. We also offer S*f*AM **Conference Studentships** to assist students who wish to attend Society meetings. The S*f*AM **Sponsored Lecture Grant** aims to assist members belonging to groups and clubs with an interest in applied microbiology to invite a guest speaker to one of their meetings. In addition, we offer a **Joint Regional Meeting Grant**, in conjunction with the Society for General Microbiology, to assist members of the Societies who wish to organise microbiology-related events in their region. We also have S*f*AM **Laboratory Fellowships** for members working in private, academic or government laboratories who wish to visit another laboratory for the purposes of technology transfer in a new technique, or similar venture.

Full details of these and other grants are available on our website. We have increased the amount of money allocated to these grants, so we are in the position to help more members than ever before. I would encourage all Full Ordinary and Full Student members to apply. This is one of the most important benefits of being a member of S*f*AM.

The Society has a number of prestigious awards. The longest standing is the **W H Pierce Memorial Prize**, sponsored by Oxoid Ltd. Nominations for this award close at the end of April, so there is still time to suggest a suitable recipient for the 2008 prize.

S*f*AM has also established a new award in 2007 — The **New Lecturer Research Grant**. This Award (up to £10,000) is intended for newly appointed lecturers, in their first permanent academic appointment in a Higher Education Institute, to pump-prime their microbiological research. In 2007 we had a large number of high calibre applications and two

Key Benefits of S*f*AM Membership

Membership Class:	Full Ordinary Members	Full Student Members	Associate Members	Retired Members
Free online access to: *Journal of Applied Microbiology, Letters in Applied Microbiology, Environmental Microbiology* and (new for 2008) *Microbial Biotechnology*	✔	✔	✘	✘
Access to grants and awards	✔	✔	✘	✘
Hard copy of *Microbiologist* (quarterly)	✔	✔	✔	✔
Reduced rates at S*f*AM conferences	✔	✔	✔	✔
Access to members only area of website (e.g. for job forum etc.)	✔	✔	✔	✔
Annual Fee	**£50***	**£25***	**£15***	**FREE**

*** Cheque Payment fee only.** Payment can also be made by credit card for which there is a small additional fee (£2.50) and by Direct Debit where there is a saving to be made on these rates (less £2.50).

awards were made. Our congratulations go to Professor Alex Rickard from the State University of New York (Binghamton) and Dr Folarin Oguntoyinbo from the University of Lagos in Nigeria. We have also established another award — the S*f*AM **Communications Award**, aimed at recognising individuals who have communicated applied microbiology to the general public. Full details of this exciting new initiative can be found on page 12.

Microbiologist

Everyone, irrespective of their membership category, will receive hard copies of our quarterly magazine for free. This can be especially useful to Associate Members, such as school teachers, and those on a career break, who have an interest in applied microbiology without it being a prime aspect of their job. The magazine covers topical subjects related to Applied Microbiology in features which are informal in style and informative in content.

Reduced rates at SfAM conferences

All members receive substantially reduced rates at all our conferences. The differential between the fees for non-members and members is often such that it makes sense to join the Society for this benefit alone!

Members only access on the website

This is a relatively new initiative and it is still evolving. Already members can log on to the members area to gain access to the most recent issue of *Microbiologist* together with a full archive of all previous issues. This is not available to non-member visitors to the site and there will be more exciting member-only benefits available online soon. If you need a reminder of your password to gain access, please contact Julie Wright at: julie@sfam.org.uk.

Of course there are other, less tangible, benefits in belonging to the UK's oldest Microbiological Society. For example, there are excellent networking opportunities for delegates who attend our conferences and we aim to give everyone a warm welcome as befits our tradition of being a friendly Society. I hope you agree that these benefits make being part of S*f*AM worthwhile. Finally I would urge all members to take full advantage of their membership entitlements, especially through attending our meetings and applying for the various grants. Our numbers are increasing year-on-year and we would welcome any suggestions you may have for future developments within the Society. Please do not hesitate to contact the Office or me directly with your suggestions.

Dr Margaret Patterson
President of the Society

ceo's column

Philip Wheat reports on the latest developments within the Society

During 2007 the Executive Committee of the Society announced and implemented several new benefits and initiatives for its members. I am pleased to announce a further brand new initiative that will be implemented in 2008. Last year we began discussions about organising an Annual Lecture designed to further enhance the scientific standing and reputation of our journal *Environmental Microbiology*. Along with our publishing partners (Wiley/Blackwell) we have been planning and organising such an event. Although the full details are not yet finalised I can announce the following:

Environmental Microbiology Annual Lecture.
Speaker: Dr Rita Colwell
Distinguished Professor, University of Maryland College Park and John Hopkins University Bloomberg School of Public Health. Senior Advisor and Chairman Emeritus, Canon U.S. Life Sciences.
Title: "Climate, Oceans, Global Warming and Cholera"
Venue: Royal Society of Medicine, London
Date: 8 September 2008

Dr Colwell's interests are focused on global infectious diseases, water, and health, and she is currently developing an international network to address emerging infectious diseases and water issues, including safe drinking water for both the developed and developing world.

Dr Colwell has an extremely impressive curriculum vitae. Amongst very many achievements she has held advisory positions for the U.S. Government, non-profit science policy organisations and private foundations, as well as in the international scientific research community. She is an internationally respected scientist and educator, and has authored or co-authored 16 books and more than 700 scientific publications. She also produced the award-winning film, "Invisible Seas", and has served on editorial boards of numerous scientific journals (including that of *Environmental Microbiology*).

We are delighted that Dr Colwell has agreed to accept our invitation to present this inaugural lecture. Dr Colwell is a long standing member of the Society and in 1999 she was awarded honorary membership as a small gesture of recognition of her work in the field.

During the second quarter of 2008 all members will receive a personal invitation to the

membership matters

event from the President. I would strongly advise that, should you wish to attend the lecture, you reply as soon as possible as places are limited and the event is sure to be popular. Full details will be available shortly.

In 2007 the Society organised a new one day meeting which was aimed at personnel working in clinical microbiology laboratories. Due to the success of this first meeting it was decided that this become an annual event. Full details of this years meeting can be found on page 26. As I write this column (during the second week in January) I can already report that we have had considerable interest in the meeting.

As I briefly mentioned in my last column the Society is experiencing a small but definite increase in its membership numbers. In addition to the new members who join when they sign up for membership at the meetings we attend, throughout the year the office also receives a steady stream of new membership applications. Now, joining the Society has become even easier with a new online payment system which was launched at the end of 2007.

I fully support the President as she highlights all the benefits that membership of the Society brings. It is really not surprising that we are increasing our membership numbers. Where else offers the value for money that membership of the Society gives you, for below £1 per week (approximately US$2 or €1.40)?

Throughout 2008 SfAM will again exhibit at several international conferences. We will be attending the **American Society for Microbiology meeting** in Boston 1 - 5 June. This will be followed by the **International Food Technology meeting** which is in New Orleans 29th June - 1st July. Finally, we will also be attending the **International Association of Food Protection meeting** in Columbus 3rd – 5th August.

As well as enrolling new members we will be very pleased to meet all our members at these events. Also do not forget if you would like to attend these meetings and you have insufficient funding why not apply for one of Society's grants such as the President's Fund **(see page 14 — Grant Finder — for further details of this and other Society grants and awards)**? If you are planning to attend any of the meetings mentioned please do stop by the stand and say hello, oh and don't forget to collect your members' lapel badge.

Philp Wheat
Chief Executive Officer

Call for Nominations to Committee

Two members of committee are due to retire in July 2008 after their three years of service: Dr Tony Worthington and Dr Andrew Sails; thus there will be two vacancies to fill in July 2008. Nominations are invited from all full members of the Society for these vacancies. Nominations must be made in writing and received by the Society Office by 9 May 2008. Should nominations exceed vacancies, election will be by a system of postal voting arranged by committee.

micropod online

Microbiology at the touch of a button

Do you want to keep up to date with Microbiology in the news? Have you seen an interesting bug-related story that you want to share? Do you feel passionately about a microbiology-related topic and want the rest of cyberspace to hear about it? Then visit **www.micropodonline.com**.

micropod online is a new technologies portal brimming with news, views, information and fun — all with a microbiological theme.

There are news stories, blogs, podcasts and micropod also has a Facebook group. Join this group and receive reminders whenever a new podcast is uploaded . We'll also let you know when the blogs have been updated so you can have a read and then have your say.

Developed by Lucy Harper of SfAM and Lucy Goodchild of the SGM, this new website was launched on 17 December 2007 with the theme: the microbiology of Christmas. Lucy and Lucy asked residents of Reading whether or not they'd be eating Turkey at Christmas. They discussed the many and varied microbiological aspects to the festive season (including mulled wine) and Lucy G interviewed Lewis Dartnell of University College London about the microbiology of space and Christmas. In January, the two Lucy's looked at hygiene and cleanliness, discussing the ever-unpleasant Norovirus and the sometimes controversial topic of hospital acquired infection. In this episode Lucy H interviewed hygiene expert Professor Sally Bloomfield of the International Scientific Forum on Home Hygieme (IFH) on hand hygiene and they discussed the Department of Health campaign:

catch it, bin it, kill it!

So, visit **www.micropodonline.com** to download or subscribe to the podcast, read the latest microbiology news, comment on the blogs or email Lucy or Lucy with any burning questions/pictures/comments/jokes/ideas you may have and stay in touch with like-minded people who share your interest in all things tiny.

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

D. Craig

Belgium

G. Derdelinckx

Bolivia

M. Iriate

Canada

A. Bourbia

Greece

C. Tassou

Iceland

O. Vilhelmsson

India

S. Dey; M. Kowshik; M. Niphadkar

Ireland

P. Cotter; A. Curtin; C. Iversen; J. Raj; P. Sawulski

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New Zealand

A. Hickson

Nigeria

M. Edema; S. Laleye; A. Olabode; O. Oyedeji

Puerto Rico

R. Montalvo

Thailand

K. Duangmal

Trinidad & Tobabgo

R. Wiseman

United Kingdom

A. Aitchison; M. Al-Mahrous; K. Apagyi; L. Appleby; D. Baxter; E. Bird; W. Bishop; R. Brown; Y. Chen; A. Cinar; T. Cowley; G. Davidson; H. Derbyshire; A. Doran; J. Duddle; S. Elliott; G. Ferreira ; D. Garcha; B. Gibson; D. Green ; L. Green; E. Hendry; A. Joy; A. King; D. Lewis; T. Madhwani; J. McDonald; N. Morris; G. Muirhead; C. Murphy; N. Oliver; C. Orji Nweke; K. Pawlowsky; A. Perry; K. Roberts; C. Rowe; E. Saggers; B. Saville; M. Souad; F. Stainsby; J. Sutula; M. Talks; M. Tangney; A. Thomas; O Tkachenko; Y. Tsang; G. Vanstone; J. Watson; C. Willis; D. Wong;

USA

F. Burns; W. Crawford; M. Frodyma

CORPORATE

Plastiques Gosselin, France

Medical Wire & Equipment, UK

Veterinary Laboratories Agency, UK

Biolog Inc., USA

Cherwell Laboratories Ltd, UK

New Lecturer Research Grant

We would like to congratulate Professor Alex Rickard from the State University of New York (Binghamton) and Dr Folarin Oguntoyinbo from the University of Lagos in Nigeria, who were both awarded a **New Lecturer Research Grant** in 2007. This is the first year of the launch of the grant and we look forward to hearing all about their work in future issues of *Microbiologist* and at a SfAM conference.

Sponsor a new Member and win a £50 Voucher of your choice!

If you feel you could be our next winner for 2008, and would like some promotional material to help you recruit new members please contact Julie Wright, Membership Co-ordinator on 01234 326661 or email julie@sfam.org.uk.

Call for nominations for W H Pierce Prize Award

Do you know a young microbiologist (under 40 years of age) who has made a substantial contribution to microbiology? If so, why not nominate them for this prestigious and substantial award which is worth £2,000. The award was instituted in 1984 by Oxoid to commemorate the life and works of the late W H (Bill) pierce, former chief bacteriologist at Oxoid Ltd and a long-time member of the Society. The prize is presented annually at the summer conference. Full Members wishing to make a nomination for the 2008 prize should write in confidence to the Hon General Secretary, Dr Anthony Hilton, at the Society Office in Bedford, including a full cv of the person nominated and a letter of support. Please note there are no official forms for this award.

Closing date for nominations is 28 April 2008.

Please note that application is through nomination by Full Members of SfAM only.

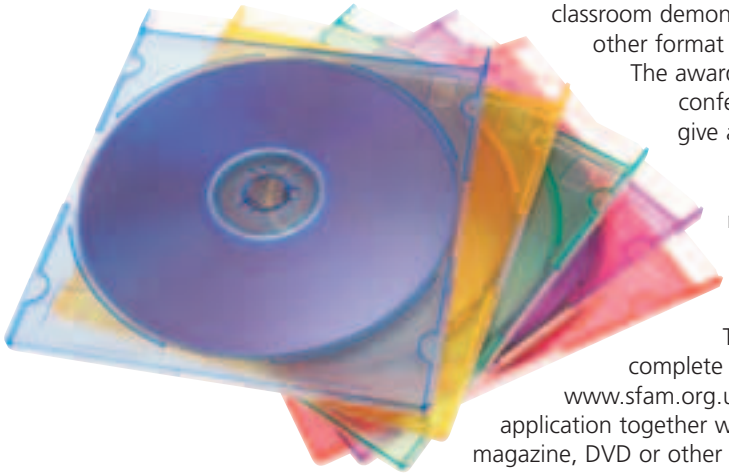
S*f*AM Communications Award

The S*f*AM **Communications Award** aims to recognise individuals who have communicated their work/applied microbiology to the general public.

The overall aim of this award is to raise the profile of applied microbiology and S*f*AM. The award will be for £1000 and nominations must be from Full Ordinary or Student members with a deadline in April each year. Nominations should be in writing, providing detailed information about all relevant media/communications work of the nominee. Nominations should be made by members of S*f*AM but nominees do not have to be members of the Society. Nominees could include:

- Professional communicators: broadcasters, authors or science writers/journalists
- Scientists who are recognised science communicators
- Scientists who are not yet recognised science communicators but have significant experience of working with the media
- Teachers/lecturers
- Artists

The nature of the communication can be local, national or international factual or fictional works including: fiction books, factual books, popular science books, newspaper / magazine articles, film, television (series or documentary), lectures or lecture series, classroom demonstrations, works of art / exhibitions or any other format a nominee considers appropriate.



The award will be presented every year at the summer conference dinner and the winner will be asked to give an after dinner speech as a condition of receiving the award. Members who make a nomination are responsible for contacting the nominee to ensure they are available on the date of the summer conference dinner.

The closing date for applications is 11 April 2008.

To make a nomination, please download and complete a pdf application form from the website: www.sfam.org.uk/grants.php and send five copies of the application together with the nominated newspaper article, magazine, DVD or other medium to the S*f*AM office.

New Grants soon to be launched

As announced in the February edition of the S*f*AM members e-bulletin, we've just launched three new grants available to Members. For more details about each grant, eligibility and an application form, please visit: www.sfam.org.uk/grants.php. **For an overview of all the grants and awards available to members, please turn to the Grant Finder on page 14.**

Hardship Grant

This grant will be available for S*f*AM members (full or student) who are studying an MPhil/PhD in applied microbiology under the direction of an academic or work supervisor who is also a S*f*AM member. These funds will be used to contribute towards the fees for higher education. The person can apply for up to £3000 per annum for three years maximum (full-time study or equivalent if studying part-time). A full application would have to be made every year with justification and detailed progression status to be considered for continuation of the award. Eligible persons will be working, taking time out to study or be self funded researchers. The applicant will also be eligible for attendance at one S*f*AM conference, towards the end of their study where a poster or oral presentation of their work must be presented. **The closing date for this award is the end of June each year.**

Research development Fund

This fund is available for S*f*AM members who

Obituary: **Muriel Rhodes-Roberts 1925 - 2007**

Muriel teaching microbiology in a laboratory at Multan, Pakistan in 1990

An Honorary member and until recently, a Custodian Trustee of the Society, Muriel Rhodes-Roberts died of Cancer in her 83rd year.

Born and educated in Lincolnshire, Muriel spent the war years in a milk testing laboratory, an experience that probably kindled her interest in microbiology. After the war she read Botany with some microbiology, at the then University College of Nottingham. She subsequently fulfilled a long held ambition to study for the Diploma in General Bacteriology at the University of Reading. On completing the course she was appointed to the post of Junior Lecturer becoming one of the founding members of the first independent Microbiology Department in the UK.

Depsite the work involved in assisting with the organisation and teaching of a novel degree course, Muriel put much effort into a research programme concerned with the then little understood and unwieldy genus *Pseudomonas*. This led to the award of a Ph.D.

In 1959 Muriel spent a very happy time as a Postdoctoral Fellow at the University of Ontario, Canada. She returned briefly to Reading before taking up a Lectureship at the University College of Wales, Aberystwyth. There she remained as lecturer then Senior Lecturer for almost 30years.

Although Muriel remained active in research right up to her retirement, she will be best remembered for her dedication to the teaching of microbiology. Her wise counsel and warm personality endeared her to staff and students alike. She was valued member of the Microbiology in Schools Advisory Committee (MISAC) for 19 years, 13 of which (1985-1998) as the official S*f*AM delegate. She also served as Vice-Chairman and Treasurer.

Although heavily committed to teaching and research, Muriel contributed in many ways to the work of the Society *viz* she was a local organiser for a summer conference and demonstration meeting as well as joint organiser of a SAB/FEMS meeting.

After her retirement in 1990, Muriel spent a few months at Multan, Pakistan where she taught a foundation course in microbiology. Thereafter she remained in Aberystwyth where, in addition to maintaining an active correspondence with colleagues and ex-students in many parts of the world, she participated enthusiastically in the life of the town, especially her local church and the town museum. She will be sadly missed by many especially her nieces and their children to whom she was a devoted aunt.

R G Board and **Dorothy Jones**

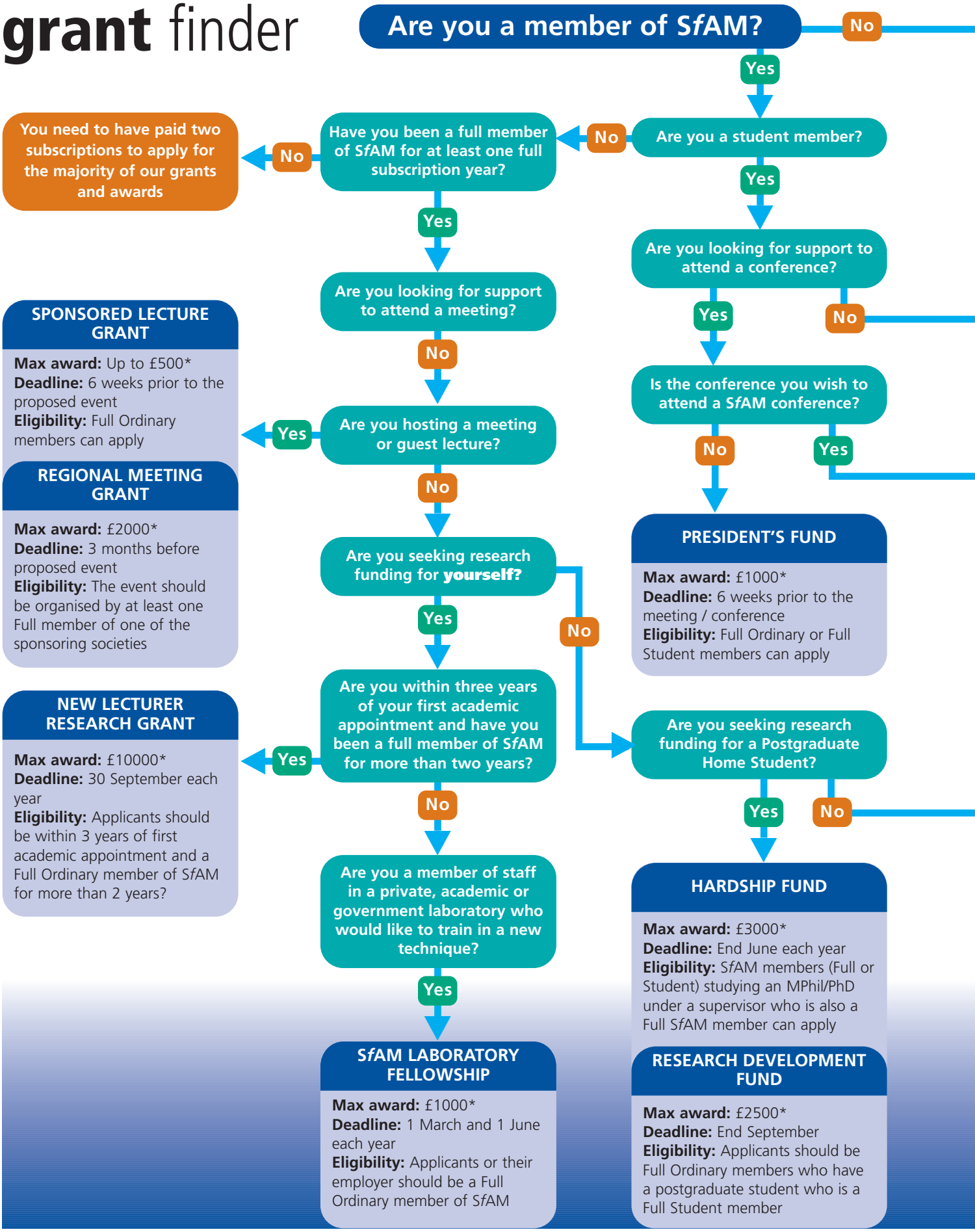
have a postgraduate research student who is also a S*f*AM member. The fund will support extra consumables or a small piece of equipment to complete work on their studies in applied microbiology. The award will be up to the value of £2500 including any relevant conference travel and support. Eligible persons will be supervising a postgraduate student and will have no funding from any additional source. **The closing date for this award is the end of September each year.**

Innovative Project Grant /Public Engagement Grant

This grant is available for an applied project where pump-priming funds are needed to develop an innovative piece of work associated with applied microbiology. The project will demonstrate how it can bridge the gap between research and the public. The project may be an event promoting a microbiological subject or an exhibition of pieces of art work which are related to applied microbiology, for example. The maximum amount awarded will be £2000. Eligible persons are S*f*AM members who have no funding from any additional source. An acknowledgement to S*f*AM must be given.

For more information about these and all our grants and awards please visit: www.sfam.org.uk/grants.php. **For an overview of all the grants and awards available to members, please turn to the Grant Finder on page 14.**

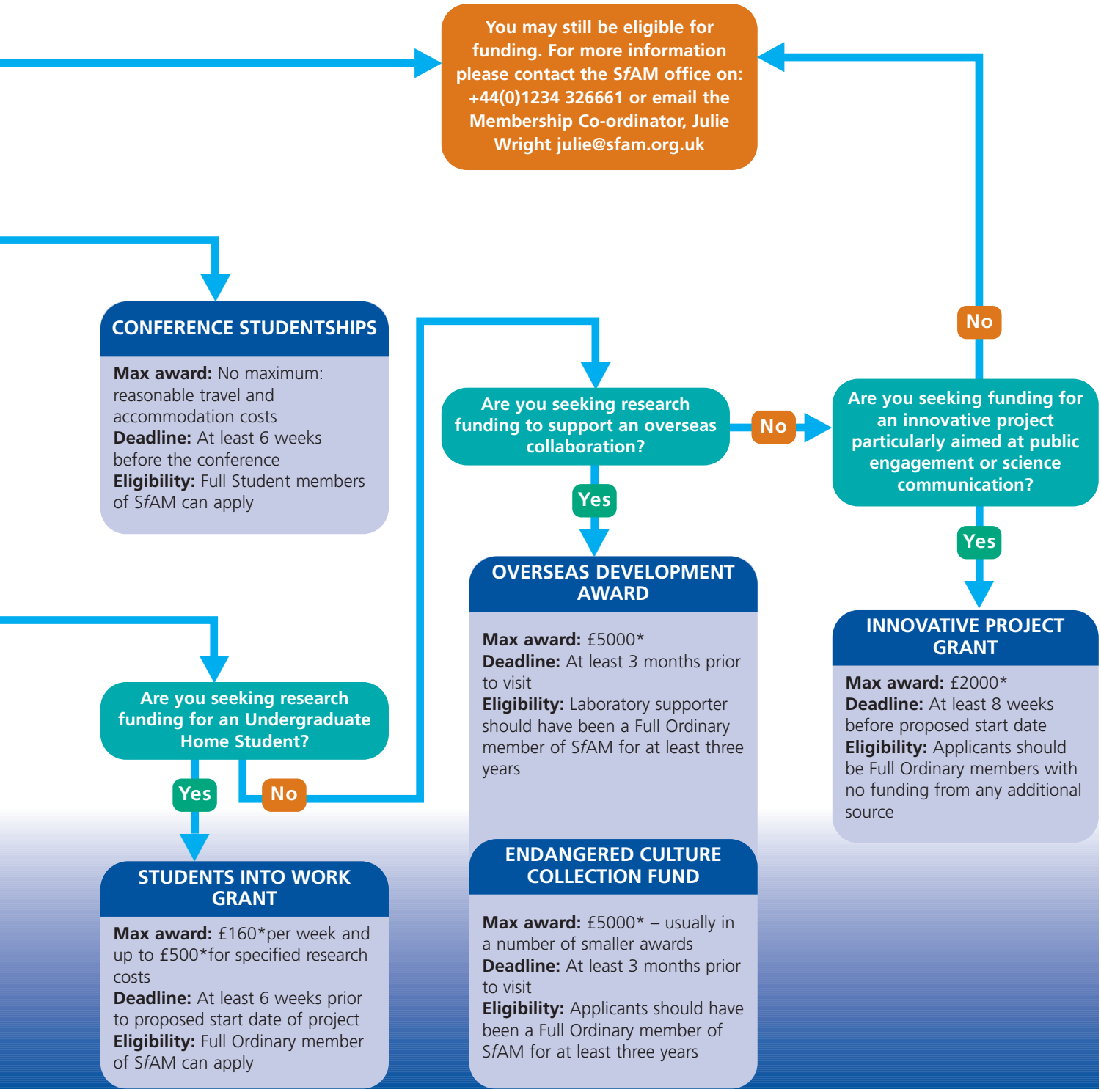
grant finder

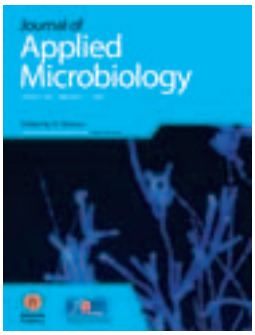


Join Now!
Please visit: **www.sfam.org.uk/joinnow.php**
to join online or to download a pdf application form

For detailed information about all our grants and awards and to download a pdf application form please visit: **www.sfam.org.uk/grants.php**

***All grants and awards are available in local currency including $US and €**





journalWatch

News about the Society's journals

The following articles published in 2007 were the top 5 most downloaded articles from Journal of Applied Microbiology between Oct-Dec 2007:

Microbial biofilms in the human gastrointestinal tract. S. Macfarlane, J.F. Dillon. **102** (5) May 2007

Early interactions between legumes and rhizobia: disclosing complexity in a molecular dialogue. J.E. Cooper. **103** (5) November 2007

Understanding the effects of diet on bacterial metabolism in the large intestine. P. Louis, K.P. Scott, S.H. Duncan, H.J. Flint. **102** (5) May 2007

Intestinal bacteria and ageing. E.J. Woodmansey. **102** (5) May 2007

Microbe-aliphatic hydrocarbon interactions in soil: implications for biodegradation and bioremediation. J.L. Stroud, G.I. Paton, K.T. Semple. **102** (5) May 2007

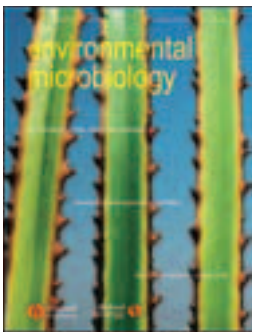
The following articles published in 2007 were the top 5 most downloaded articles from Letters in Applied Microbiology between Oct-Dec 2007:

Screening and mutagenesis of a novel *Bacillus pumilus* strain producing alkaline protease for dehairing. H.Y. Wang, D.M. Liu, Y. Liu, C.F. Cheng, Q.Y. Ma, Q. Huang, Y.Z. Zhang. **44** (1) January 2007

Role of commercial probiotic strains against human pathogen adhesion to intestinal mucus. M.C. Collado, J. Meriluoto, S. Salminen. **45** (4) October 2007

Absolute and relative real-time PCR in the quantification of tst gene expression among methicillin-resistant *Staphylococcus aureus*: evaluation by two mathematical models. V. Chini, A. Foka, G. Dimitracopoulos, I. Spiliopoulou. **45** (5) November 2007

A novel multiplex PCR for the identification of *Vibrio parahaemolyticus, Vibrio cholerae* and *Vibrio vulnificus*. A. Bauer, L.M. Rorvik. **45** (4) October 2007



Relationship between mycobacteria and amoebae: ecological and epidemiological concerns. V. Thomas, G. McDonnell. **45** (4) October 2007

The following articles published in 2007 were the top 5 most downloaded articles from Environmental Microbiology between Oct-Dec 2007:

Theory and the microbial world. Tom Curtis. **9** (1) January 2007

Some bacteria degrade explosives, others prefer boiling methanol. Michael Y. Galperin. **9** (12) December 2007

Metagenomic analysis of the microbial community associated with the coral *Porites astreoides*. Linda Wegley, Robert Edwards, Beltran Rodriguez-Brito, Hong Liu, Forest Rohwer. **9** (11) November 2007

Life in Darwin's dust: intercontinental transport and survival of microbes in the nineteenth century. Anna A. Gorbushina, Renate Kort, Anette Schulte, David Lazarus, Bernhard Schnetger, Hans-Jurgen Brumsack, William J. Broughton, Jocelyne Favet. **9** (12) December 2007

Steering directed protein evolution: strategies to manage combinatorial complexity of mutant libraries. Tuck Seng Wong, Danilo Roccatano, Ulrich Schwaneberg. **9** (11) November 2007

microbial biotechnology

The first issue of Microbial Biotechnology is now available to read online:
www.blackwell-synergy.com/loi/mbt

Highlights of the first issue include:

Massively parallel pathogen identification using high-density microarrays. Nicolas Berthet *et al.* **1** (1) January 2007

Mutant HbpR transcription activator isolation for 2-chlorobiphenyl via green fluorescent protein-based flow cytometry and cell sorting. Siham Beggah, Christelle Vogne, Elena Zenaro, Jan Roelof van der Meer. **1** (1) January 2007

Brief Report: Rhizoremediation of lindane by root-colonizing *Sphingomonas*. Dietmar Böltner, Patricia Godoy, Jesús Muñoz-Rojas, Estrella Duque, Silvia Moreno-Morillas, Lourdes Sánchez, Juan Luis Ramos. **1** (1) January 2007

With the accelerating exploration of microbial diversity, important new applications are emerging that promise to revolutionize the field of biotechnology. *Microbial Biotechnology* will publish the best original research (upper 25%) on applications of microbial activities and products and intends to become the leading journal in the field. To participate in this exciting venture, submit your best work now. Submit your manuscript at: **http://mc.manuscriptcentral.com/microbio**
Visit the journal homepage: **www.microbialbiotech.com.**

Lucy Mansfield
Wiley-Blackwell

MED•VET•NET

4th Med-Vet-Net Annual Scientific Meeting Preview

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 16 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. Med-Vet-Net officially commenced on 1 September 2004, and is funded to the value of €14.4 million for five years.

The 4th Med-Vet-Net Annual Scientific Meeting will be held at Palais du Grand Large, in the historic town of St Malo, in Brittany, France from 11 to 14 June 2008.

The previous three meetings have been great successes, with a high standard of science, and a great opportunity for networking and knowledge sharing. We anticipate around 300 participants, with about a third from outside of the Med-Vet-Net Partner Institutes. Previous participants have come from throughout Europe as well as the North America, Australia and New Zealand. Interested members of S*f*AM are very welcome to attend the meeting; there are reduced delegate fees for students. Some places fully funded by Med-Vet-Net might be available to S*f*AM members; please contact the Med-Vet-Net Communications Unit for more information.

Scientific themes

The scientific subjects of the meeting are microbiological aspects of zoonotic diseases. These include viral, bacterial and parasitic microorganisms. Scientific contributions to the following fields are invited:

- Detection and Control
- Epidemiology
- Molecular Epidemiology
- New and Emerging Zoonoses
- Antibiotic Resistance
- Risk Research (including modelling, source attribution)
- Host–Pathogen Interactions (including *in vivo* and *in vitro* models)
- Genomics and Proteomics (including transcriptosome analysis)
- Other aspects related to zoonoses

Cross-disciplinary contributions are encouraged

Abstracts should be no longer than 250 words. Further information and online abstract submission are available from: http://medvetnet.conference-services.net/.

Deadlines

The abstract submission deadline is: **31 March 2008.** Registration for the meeting closes on **30 April 2008.**

Keynote Speakers

At the time of writing, confirmed keynote speakers include:

Professor **Geoffrey Mead**, who will speak on *'The use of probiotics and prebiotics in farm animals for prevention and control of food-borne human disease.'* Professor Mead was formerly at the Royal Veterinary College, University of London, now a consultant, he has an international reputation for his work on the microbial safety and quality of poultry meat.

Dr **Mohamed Karmali** will speak on *'Pathogenomics in public health.'* Dr Karmalis is Director General of the Laboratory for Foodborne Zoonoses, Public Health Agency of Canada.

Please check the conference website for further details of keynote speakers: **www.medvetnet.org/mvnconf08.**

About St Malo

St Malo is on the northern coast of France in scenic Brittany With a huge sandy beach and ancient walled city, St Malo is a delightful place to visit. The meeting will be held at the Palais du Grand Large Convention Centre, situated on the sea front, in the heart of St Malo town.

The citadelle is full of shops, bars and restaurants. St Malo has one of the highest concentrations of sea food restaurants in Europe. It is famous for its local oysters from the nearby village of Cancale.

More information on travelling to the meeting, hotels and tourist information are available from the conference website: **www.medvetnet.org/mvnconf08.**

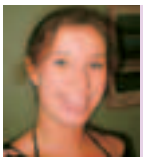
Sponsorship opportunities

With the generous support of industry we plan to maintain and improve upon the high standards of past conferences. Med-Vet-Net are currently seeking sponsors for the meeting. This could prove an ideal opportunity for UK businesses to contact researchers throughout Europe and beyond; we will have numerous delegates from Poland and Hungary as well as other Eastern European countries.

Further details of sponsorship packages are available from: **http://www.medvetnet.org/pdf/Conferences/stmalo_sponsorship.pdf**

information

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



Jennie Drew

Wireless Microbiology

Clive Beggs discusses the pleasures and pitfalls of talking to the media

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.**

For many years I have had a, not so secret, love affair with the wireless. I wake up with it, drive my car with it, and at the end of the day, go to sleep with it. I love the interviews, the sports reports, the comedy sketches, and above all, those science and nature programmes which illuminate the listener's mind with insights of far away places. To me the radio represents the very best in broadcasting. However, on a cold January night in 2003, that love affair was about to be put under serious strain. I was sitting on my own in a 'studio-cum-broom cupboard' at the BBC's offices in Leeds, about to be interviewed by Peter Allen for Radio Five's evening 'Drive' programme. In just a minute I would be speaking live to the nation! I was a cocktail of emotions; uncertainty, fear and excitement were all there. What would he ask me? Would I be able to answer the questions? This is my chance; I'd better not mess up! If you've been there, then you will recognise the feelings. Then over the headset I heard Peter's voice and we were off — the novice in the hands of the master! I had three minutes to explain to the world the results of a trial involving negative air ionizers in the intensive care unit at St James's Hospital in Leeds. For the first minute or two things went pretty well. I explained how the ionizers had been associated with dramatic reduction in *Acinetobacter* infections on the unit. Then, Peter threw a 'curved-ball' and started to quiz me on various issues associated with handwashing, something which at the time we had not been investigating. I tried my best and somehow struggled to the end of the interview and was mightily relieved when the whole thing was over – an exhilarating experience maybe, but one that should not be undertaken lightly!

That first radio interview taught me an important lesson, one which has served me well though many subsequent newspaper, radio and TV interviews: "Talk about what you know, not about what you don't know!"

In my case this is particularly important. I am something of an unusual beast, a mechanical engineer working in applied microbiology. I work at the University of Bradford where I lead the Bradford Infection Group, a multidisciplinary research team which focuses on the role that the clinical environment plays in the spread of infection in hospitals. Although I have worked with clinicians for many years, and am now as much a biologist as an engineer, I am not a clinician. My interests lie more in understanding how infection is transmitted around wards, rather than in treating individual patients. In short, I want to know how microorganisms get from A to B and what they do in between — something which I believe is not well understood. Unfortunately, TV and radio interviewers do not necessarily understand such nuances and are prone to ask scientists questions about clinical practice and vice versa. I have heard a number of interviews on the radio where, in my opinion, the expert has come unstuck, because they strayed out of their area of expertise. Nowadays, when I give an interview or take part in a discussion programme, I always try and brief the producers beforehand about my

work. They usually find it helpful and hopefully it saves me from being asked any 'out of field' questions. If possible, it's a good idea to send the journalist or producer some of your papers – the better they are briefed, the better the resulting programme or article.

One of the greatest hazards when dealing with the press is being misunderstood or misquoted. It's not really that surprising, when you think about it. Microbiology is a complex subject and you are the professional working in the field. By comparison, most journalists are not scientists and they tend to flit between stories — today they may be covering an outbreak of MRSA, tomorrow it may be a story about passenger safety on aircraft. So perhaps they can be excused for getting things wrong from time-to-time. One great way to avoid this problem is to issue a good press release, which states exactly what you have been doing. There is quite an art to producing a good press release. First and foremost it needs to state in clear and relatively simple terms; what you have done; why you did it; and what you have discovered. It also needs to point out the relevance of your discovery to the wider world. But this in itself is not enough. In order to do its job, a press release has to grab the attention of journalists, so it mustn't be dull. It's a good idea to put quotes in the press release from key members of the research team. Journalists love quotations and you will find the quotes from the press release cropping-up all over the place. After all, most journalists are no different from you or me; they will generally take the easy route and use what is placed in front of them. So it is important to place something good in front of them. In doing so you can call the shots! Remember, if you don't feel confident about writing a Press Release yourself, then ask your University, Institution or Society Press Officer to write it for you. They will be glad to help.

I personally find writing press releases an excellent exercise because it forces me to think about what I want to say. Like the proverbial boy scout, it is important when taking part in a programme, or giving an interview, to be prepared. When I take part in a radio or TV programme, I always take time out beforehand to prepare myself. I write down the key points that I want to get over and then I think of short phrases, statements and illustrations which will get the message across in a clear and concise form. It is also helpful to learn some stock statistics, as these will add weight to your argument. This is a useful exercise because it helps you to get clear in your own mind what you want to say. When you are broadcasting live to the nation and have no idea what the next question will be, it is a great help to have a stock set of illustrations and answers that you can rely on in the heat of battle!

No matter how well you have prepared, my experience is that you will still get questions that are out of your field of expertise, or for which you are not fully prepared. With the former, I suggest that you simply state that you cannot answer the question because it is not your area of expertise. There is no shame in this. We cannot all be experts in everything! Many years of working in multidisciplinary teams has taught me that nobody knows everything. For example, clinicians generally make poor mathematical modellers, and very few microbiologists that I know can dress a wound on a patient. However, with questions that are within your field of expertise, but of whose answer you are not entirely sure, I find a good policy is to express an informed opinion. Indeed, given the many uncertainties surrounding infection control, frequently all anyone can do is give an informed opinion. In such circumstances I tend to preface my answers with statements such as: "There is a lot of uncertainty surrounding this subject, but in my opinion the evidence suggests…" By doing this I am giving an informed opinion, while stating very clearly that I might be wrong. Again, I see no shame in this. Research scientists should inhabit uncertain ground and therefore are always at the forefront of ignorance. Too often have I heard people confidently make pronouncements which later turned out to be unsubstantiated. In my opinion, it is much better to stick to the facts and to qualify any statements you make, if any uncertainty exists.

Having stressed the pitfalls of broadcasting, please don't let me put you off. I personally get a great buzz from appearing on the TV or radio. For example, my colleague Prof Kevin Kerr and I were recently invited to appear live on Radio Four's science programme 'Material World'. I found it great fun and enjoyed very much the input from the other contributors. It was particularly satisfying to have an opportunity to explain our work to the British public. After all, like many other scientists, I spend many hours writing scientific papers which are read by only a few people. So I did not take lightly the chance to communicate with the wider world. I believe that it is important that we as scientists communicate directly with the public; otherwise they will have no idea of what we are doing. Given that public money funds our research, I believe that we have a duty to disseminate our findings far and wide. Furthermore, if we do not engage with the public, then we will not be able to inspire the next generation to follow in our footsteps.

Clive Beggs
Professor of Medical Technology,
University of Bradford

Dr Jean-Yves Maillard and Professor Geoff Hanlon with Professor Sean Gorman

Quality Assurance and Alchoholic Beverages

information

For more information about the Society's meetings please visit the website at: www.sfam.org.uk

You can also find details of this years' Spring Meeting and Summer Conference on pages 24 and 26 respectively of this issue of *Microbiologist*

This years Society Winter meeting was held on the 9th January 2008 at the Royal Society, London. There were two themes for the day, Quality Assurance in Microbiology and the Microbiology of Alcoholic Beverages.

Following the tradition of previous Winter meetings the opening presentation was the Denver Russell Memorial lecture. This lecture commemorates the life and works of the late A. Denver Russell (1936-2004), Professor of Pharmaceutical Microbiology and long time member of the Society. This years' lecture was given by Professor Sean Gorman, of the School of Pharmacy, Queen's University, Belfast. The title of his presentation was *"Prevention of biomaterial-based medical device related infection."*

Professor Gorman highlighted that the use of medical devices for temporary or permanent implantation has become common and constitutes a major advance in modern medicine. However, concomitant with this increased use he demonstrated that there are associated problems. In particular, device-related infection is a problem which inflicts all medical devices and this can cause morbidity and mortality in many cases.

Prof Gorman highlighted that in the UK approximately 0.5 million hospital patients develop nosocomial infections each year with approximately 80% of the 20,000 annual deaths being device-related. The key to resolving the problem of device-related infection is to prevent bacterial adherence to the device biomaterial and the inevitable formation of antimicrobial-resistant microbial bio-films. Prof Gorman described the formation of such a bio-film using electron-micrographs taken from an endo-tracheal tube and samples taken at 4, 8 and 12 hours which eloquently illustrated the formation of a bio-film on the device. Prof Gorman commented that the main causes of biofilm formation were surface roughness of the device, charge and the hydrophobic character of device surface and also the cell-to-cell signalling which has shown to be present in the adhering bacterial cells.

He then highlighted that various strategies that had been developed to minimise the risk of bio-film development. These include devices containing antimicrobial compounds, bio-degradable bio-materials, devices with ultra hydrophobic coatings and photodynamic therapies. These therapies rely on photo sensitive porphyrin compounds being incorporated into the device then being excited by an intense light source rendering them active against bacteria.

The penultimate presentation of the opening session was presented by Dr Sandy Primrose a Consultant, based in High Wycombe, who has an extensive background in the commercial sector. His presentation was the first with the theme of the quality assurance. The title of his thought provoking talk was *"Quality assurance in the university laboratory — is it*

Professor Sean Gorman presenting the Denver Russell Memorial lecture

Winter Meeting 2008 Report

necessary?" Dr Primrose highlighted examples where experimental failures caused major economic cost (which can be quantified) but this also led to staff disillusionment with science.

He demonstrated that experimental failure can be eliminated and if eliminated the gains are not just financial but also result in improvement in staff morale and productivity. He described the major causes of experimental failure including pipettes, equipment, water, chemicals/biochemicals, stains and cell lines, experimental design, poor or no standard operating procedures and record keeping. He then went on to discuss strategies to eliminate or minimise these causes of experimental failure.

The final presentation was the first with the theme: microbiology of alcoholic beverages. The presentation was given by Dr Katherine Smart from the University of Nottingham and her title was *"Systems approaches to optimize lager fermentations."*

Dr Smart commented that the hybrid nature of brewing lager yeast strains has positive and negative factors associated with it. For example, it provides adaptive potential but at the same time, yields genome instability and this can adversely affect fermentation performance. There has been a tendency towards the adoption of molecular tools to assist in differentiation between production strains and assessment of master cultures for genomic instability. The development of genome-wide transcriptional and protein expression techniques has generated considerable interest from brewers.

Dr Smart went on to discuss a systems approach to the optimisation of lager fermentation which relies on the process of flocculation. This allows yeast to be recovered from the beer at the end of fermentation.

Philip Wheat
Chief Executive Officer

Session A: Quality assurance and accreditation issues in microbiology

Delia Cope of the United Kingdom Accreditation Service (UKAS) opened the session with a presentation outlining some common problems and misconceptions regarding getting your laboratory accredited. In her presentation she gave an overview of the role of UKAS as the sole national accreditation body recognised by the government to assess organisations that provide certification testing, inspection and calibration services. She highlighted the stages of the assessment process with particular regard to ISO 17025 the International Standard that specifies the general requirements for the competence to carry out tests and/or calibrations. The accreditation process was described and the need for setting realistic timescales for the process and also ensuring the lab has adequate resources for the task of accreditation

were also highlighted. The importance of having a documented quality management system and quality manual as a basic requirement for laboratory accreditation was described and how quality management procedures must be established for how the system is maintained. She also emphasised that when the system is established and documented it must be implemented in the laboratory for several months to establish the records that an accreditation body will review at an accreditation audit.

Molecular detection methods such as PCR and real-time PCR have had a profound impact on many areas of diagnostic clinical microbiology, particularly for the detection of slow growing or difficult to grow infectious agents. Quality control has become increasingly important in the implementation of molecular diagnostic testing for the diagnosis of infectious disease. In particular external quality control (EQA) schemes play a very crucial role to ensure high standards in molecular diagnostics. The first external quality control scheme to be developed was the European Union Quality Control Concerted Action for Nucleic Acid Amplification in Diagnostic Virology. This temporary entity was superseded by Quality Control for Molecular Diagnostics (QCMD), a non-profit organisation for the standardisation and quality control of molecular diagnostics and genomic technologies (www.qcmd.org). This organisation sends out proficiency panels of simulated clinical samples containing a wide range of viral and bacterial pathogens for molecular diagnostic assays. Dr Paul Wallace the general manager of QCMD presented an overview of the current QCMD EQA schemes and described some of the benefits of participating in the distributions. He highlighted the usefulness of the EQA feedback sent out by QCMD which allows individual labs to assess the performance of their diagnostic assays and compare their results with those of other labs. The inconsistency in the way individual labs report quantitative results from assays was particularly surprising with labs using a range of units per ml including copies, international units, genome equivalents, Mega-equivalents and Log^{10} copies. He also described a new on-line system QCMD are planning on launching which will allow participants to monitor run performance of individual assay runs. Participants will be able to input the results of run controls on a run-by-run basis and then produce control charts and other comparisons to monitor assay performance in real-time.

Julie Russell, Head of the Food and Environmental Proficiency Testing Unit (FEPT) at the Health Protection Agencies (HPA) Centre for Infections in London gave an overview of external quality assessment in food, water and environmental microbiology. The unit provides proficiency testing and EQA schemes for over 1,000 laboratories in more than 40 countries. EQA samples are sent out to participating laboratories who examine them using their normal routine methods and then report the results back to the FEPT unit. The purpose of the EQA is to provide an insight into a laboratory routine standard of performance and help maintain or improve it. The EQA samples take the form of either qualitative "presence/absence" specimens or "enumeration" specimens. The samples are either distributed as freeze-dried suspensions or in a novel inert format called a lenticule which were first described by Dr Arthur Codd at Newcastle Public Health Laboratory. Lenticules consist of control-dried plano convex discs in which biologically-active materials are contained within a water-soluble matrix. Because they can be produced to contain stable numbers of bacteria from 10 cfu/lenticule to 108 cfu/lenticule they are also suitable for incorporation into a routine quality control system, either for process control or media testing.

Many clinical and environmental microbiology laboratories consider audits as a necessary evil which is performed to ensure compliance with accreditation authorities. This obviously has cost implications in terms of staff time and effort and often we overlook the value of such activities. In his presentation *"Effective Quality Audit"* Professor Ian Sharp, Head of Quality at the HPA Centre for Infections reminded us that audit is a very powerful improvement tool rather than just a box ticking exercise. He highlighted that performing audit for compliance with set standards "we are in danger of just ensuring that we are using the right nuts and bolts" when we really "need to look at the processes to make sure the nuts and bolts are assembled the right way." We were reminded of the need to draw on the expertise of all staff both as auditors and "auditees" and to encourage staff to make improvements at any time rather than just during audits. The outcomes from a successful audit were described such as "improvement suggestions have been made" and any non-compliances identified. The resolution of non-compliances and potential improvements to service identified by audit often can be difficult to achieve and management involvement is necessary however getting "buy in" from senior management can be difficult. Finally he reminded us that we must stop looking at the cost of maintaining quality systems and focus on the value of quality and audit in an organisation.

The final lecture in the session, *"Uncertainty of measurement in food and environmental microbiology"* was given by Melody Greenwood. Subtitled in Donald Rumsfeld style, 'Living with the

known unknowns' the presentation introduced the audience to the concept of uncertainty of measurement. Melody played a pivotal role in formulating and drafting the Health Protection Agency QSOP-4 "Uncertainty of Measurement in Testing" the Guidance Note produced to help laboratories understand and comply with the requirements of BS EN ISO/IEC 170252 for estimation of uncertainty of measurement. Evaluation of the uncertainty of measurement is important as it provides a quantitative indication of the analytical variability of a result. There are many potential sources of uncertainty which include: technical competence of the individual performing the test, changes in the characteristics or performance of a piece of equipment since the last calibration, or personal bias in reading instruments. Melody noted that the assessment of measurement uncertainty (MU) should be an on-going process to show that the estimation remains relevant and the test results are under control. MU also has to be re-assessed if there are any changes to the critical factors such as change of equipment or personnel, change or modification of method or isolation medium. In closing the audience were reminded that MU is a value associated with a result and not a method and should not be used to measure laboratory competency. In addition high MU values are a strong indicator of possible problems and should be investigated and that very low values would suggest that MU is being wrongly assessed.

Andrew Sails
HPA, Newcastle-Upon-Tyne

Session B: Microbiology of alcoholic beverages

It has been some time since S*f*AM has had a scientific meeting on alcoholic beverages but the morning's plenary lecture by Katherine Smart and the afternoon session helped remedy this. In a series of papers, microbiological aspects of the production of beers, wines, Scotch whisky and cider were all covered.

Guy Derdelinckx from the University of Leuven described the unique and fascinating microbiology of Belgian lambic beers where the combined activity of a variety of organisms is required to produce the distinctive character of these products. Most notably this includes members of the enterobacteriaceae, lactic acid bacteria, *Saccharomyces* and *Brettanomyces* yeasts which are all introduced as natural contaminants during the production process but nonetheless form a resistant natural community.

Bob Lovitt from the University of Swansea described work on the malo-lactic fermentation in cider maturation. This fermentation is conducted by lactic acid bacteria tolerant of the low nutrient, high alcohol and high acidity conditions, principally strains of *Oenococcus oeni* and *Lactobacillus brevis*. Important in the maturation of both wine and cider, it stabilises the product, reduces its acidity and makes important contributions to flavour. The natural fermentation can be slow and unreliable; simple addition of appropriate starter cultures is one remedy for this but Bob focused particularly on the use of membrane bioreactors to maintain a high concentration of active lactic acid bacteria and achieve a rapid and reproducible fermentation.

Ostensibly the only microorganisms used in the production of Scotch whisky are yeasts but Derek Jamieson from Heriot Watt University gave an account of how modern molecular techniques have been used to identify other organisms, particularly lactic acid bacteria, which play an important role in the development of the distinctive and much appreciated flavours associated with malt whisky.

Although several speakers had discussed organisms less commonly acknowledged for their role in alcoholic beverage production, Bruno Blondin from INRA, Montpelier refocused our attention on the central role of yeasts and how the transcriptome and proteome of wine yeast change from the point where the yeast is rehydrated right through to the end of the fermentation. Major regulatory events were seen during rehydration-inoculation and during the entry of the yeast into stationary phase. The overall protein abundance correlated with the mRNA abundance but changes in the proteome were much weaker than those in mRNA indicating that the proteome was much more buffered than the transcriptome and that post-transcriptional control was important in the regulatory process.

We returned to brewing for the last talk of the day given by Barry Axcell, Group Chief Brewer for SABMiller in South Africa. Barry described a fascinating investigation into the cause of premature flocculation of yeast during beer fermentation. This is a sporadic problem associated with barley malt where under certain conditions enzymes from the fungal flora on the barley grain break down arabinoxylans associated with the husk producing polysaccharides which act as targets for the lectin-like molecules on yeast cells that cause flocculation. It was an excellent presentation with which to round off the day as an outstanding illustration of microbiology helping to solve problems in the real world.

Martin Adams
Meetings Secretary
University of Surrey

Spring meeting 2008

A one day meeting on

Broadening Microbiology Horizons

Aston University, Birmingham
Wednesday 9 April 2008

Programme

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

10.35-11.05 **Latest developments in the detection and isolation of MRSA**
Steve Davies, Northern General Hospital, Sheffield

11.05-11.35 **The Fusobacteria and human disease**
Mike Wren, The Windeyer Institute of Medical Sciences,London

11.35-12.05 **Necrotising fasciitis**
Gus McGrouther, University of Manchester

12.05-12.35 **An infusion of Gram negatives (case study)**
Rob Townsend, Northern General Hospital, Sheffield

12.35-14.00 **Lunch**

14.00-14.30 **An update on Syphilis**
Penny Goold, Whittall Street Clinic, Birmingham

14.30-15.00 **Value of typing *Cl. difficile***
Val Hall, University Hospital of Wales, Cardiff

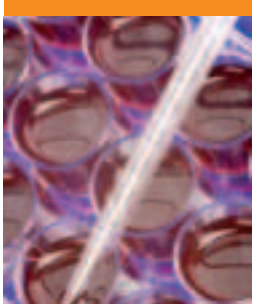
15.00-15.30 **PVL producing *Staphylococcus aureus***
Angela Kearns, Health Protection Agency, London

15.30-16.00 ***Mycoplasma pneumoniae* the hidden cause of RTIs**
Mark Fielder, Kingston University, Kingston-upon-Thames

14.45-15.05 **Tea and coffee**

IBMS CPD ACCREDITATION

A TOTAL OF 6 CREDITS HAS BEEN AWARDED FOR THIS MEETING



For the latest programme please visit us online at: **www.sfam.org.uk/spring_meetings.php**

BOOKING FORM and INVOICE

SfAM SPRING MEETING WEDNESDAY 9 APRIL 2008

Only ONE person per form please. CLOSING DATE FOR REGISTRATIONS: Friday 28 March 2008
EARLY BIRD DISCOUNT of £30.00 is applied to all bookings made before **Wednesday 5 March 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.

***Non members please note:** You can add 1 year's membership to your event booking using this form, then register at the member rate and spend the same amount of money or less!

FEES	Before 5/03/2008	Between 5/03/2008 and 28/03/2008
Full member	£50 ☐	£80 ☐
Student member	£30 ☐	£60 ☐
Honorary member	£30 ☐	£60 ☐
Associate member	£30 ☐	£60 ☐
Retired member	£30 ☐	£60 ☐
Student non member and IBMS member	£60 ☐	£90 ☐
Non member	£100 ☐	£130 ☐

*ADD MEMBERSHIP TO YOUR BOOKING

Add Student membership (£25.00): ☐ **Add Full membership (£50.00):** ☐

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

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

TOTAL Amount enclosed/ to be charged: £_____

Card number: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ Solo Cards only: ☐☐☐

Issue No. ☐☐☐ Expiry Date: ☐☐☐☐ Start Date: (*Debit cards only*) ☐☐☐☐

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Signature:_____ Date:_____

Please return the completed form by fax (post if you are enclosing a cheque) to: **The Society for Applied Microbiology, Bedford Heights, Brickhill Drive, Bedford MK41 7PH, UK. Tel: 01234 761752 Fax: 01234 328330. Email: meetings@sfam.org.uk**

Summer conference 2008

Including the Lewis B Perry Memorial Lecture — ***Microbiology in the political arena*** given by Dr Bernard Dixon OBE

The microbiology of water in work, rest and play

Wellington Park Hotel, Belfast
Monday 7 to Thursday 10 July 2008

CPD ACCREDITATION APPLIED FOR

Including sessions on:

- Recreational waters
- Waters in aquaculture and industry
- Management of contaminated water
- Potable water

There will be a packed social programme including:

- Drinks reception and keynote lecture at Queens University, Belfast
- Dinner at Stormont — the Northern Ireland Parliament buildings
- Trade exhibition — including a competition with many prizes to be won

call for abstracts

If you would like to submit an abstract for a poster or student oral presentation in any relevant subject area please download an abstract submission form from our website at: www.sfam.org.uk/summer_conference.php

Deadline for abstract submissions is 5 May 2008

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

Monday 7 July

14.00 onwards **Arrive and Register**

18.00-18.50 **Lewis B Perry Memorial Lecture - Queen's University Belfast Microbiology in the political arena**
Bernard Dixon

19.00-20.00 **Drinks Reception - Queen's University Belfast**

20.00 **Evening at leisure**

21.30 **Quiz Night - Wellington Park Hotel**

Tuesday 8 July

Recreational waters

09.00-09.35 **Recreational water - would you dare go for a dip? Overview of recreational water and disease**
Kathy Pond, University of Surrey, UK

09.35-10.00 **From bath toys to recreational and hydrotherapy pools**
Adam Fraise, Birmingham Hospital, UK

10.10-10.45 **Recreational exposure to *Leptospira***
Jarlath Nally, University College Dublin, UK

10.45-11.15 **Coffee/ posters**

11.15-11.50 ***Vibrio vulnificus*: a killer lurking on our beaches**
James Oliver, University of N. Carolina, USA

11.50-12.25 **Aquatic mycobacteria**
Joseph Falkinham, Virginia Tech, USA

Industrial/commercial water use

12.25-13.00 **Disease outbreaks associated with aquaculture using waste heat from industry**
Keith Way, CEFAS, Weymouth, UK

13.00-14.00 **Lunch**

14.00-14.35 **Antimicrobial usage in aquaculture: problems with microbial resistance, its determination and interpretation**
Peter Smith, NUI, Galway, UK

14.35-15.10 **Norovirus reduction in commercial depuration in Europe**
Rachel Rangdale, CEFAS, Weymouth, UK

15.10-15.45 **Sterile but unsafe: endotoxin testing in water in the pharmaceutical industry**
David Guy, Lonza, Wokingham, UK

15.45- 16.15 **Tea/posters**

16.15-16.50 **Biofilm problems in dental unit water systems and its practical control**
David Coleman, University of Dublin, Ireland

16.50-18.00 **Student Session**

17.30-19.30 **Trade Show**

Wednesday 9 July

Management of contaminated waters

09.00-09.35 **Private water supplies**
David Kay CREH, University of Wales, UK

09.35- 10.10 **Wastewater disinfection**
Nigel Horan, University of Leeds, UK

10.10-10.45 **Impact of sheep dip pesticides on biofilms involved in secondary sewage treatment**
Keith Jones, University of Lancaster, UK

10.45-11.15 **Coffee/ posters**

11.15-11.50 **Health risks associated with flooding**
Lorna Fewtrell, Centre for Research into Environment and Health, Crewe, UK

11.50-12.25 **Wastewater use in agriculture**
D. Mara, University of Leeds, UK

12.25- 13.25 **Lunch**

13.25 -14.00 **Soil aquifer treatment of drinking water to remove cyanobacterial toxins and microorganisms**
Howard Fallowfield, Flinders University, Australia

14.00-14.35 **Myth management and risk assessment for *Legionella***
John Lee, HPA, Colindale, UK

14.35 -15.00 **Tea/Posters**

15.00 -16.00 **Student presentations**

16.00 -16.30 **WH Pierce Prize**

16.30 -17.00 **AGM**

19.30-20.00 **Drinks reception followed by dinner - Stormont Parliament Building**

Thursday 10 July

Potable water

09.00-09.35 **Exposure & health risk of *Salmonella* and enteric viruses in recycled water used for crop irrigation**
Chuck Gerba, University of Arizona, USA

09.35-10.10 **Safe water in the developing world - on site testing and solar pasteurisation**
Jamie Bartram, WHO, Geneva, Switzerland

10.10-10.45 **Finding a needle in a haystack: detecting *Cryptosporidium* in drinking waters**
John Watkins, CREH Analytical Ltd, Leeds

10.45-11.15 **Coffee/ posters**

11.15-11.50 **Outbreaks of infectious disease associated with private drinking water supplies in England & Wales 1970-2005**
Gordon Nichols, HPA, Colindale

11.50-12.25 **Environmentally adapted strains? Multi locus sequence typing of *Campylobacter jejuni* and *C. coli* in surface waters and humans**
Will Sopwith, HPA, Colindale, UK

12.25-13.00 **The microbiology of bottled mineral waters**
Gilbert Lamothe. Nestlé Waters MT, Vittel, France

13.00-14.00 **Lunch & Close**

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

BOOKING FORM and INVOICE

SfAM SUMMER CONFERENCE 7 — 10 July 2008

Only ONE person per form please. CLOSING DATE FOR REGISTRATIONS: Monday 30 June 2008
EARLY BIRD DISCOUNT of £30.00 is applied to all bookings made before **Friday 6 June 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.

***Non members please note:** You can add 1 year's membership to your event booking using this form, then register at the member rate and spend the same amount of money or less!

FEES BEFORE 6 JUNE 2008	Full Member	Student, Honorary, Associate & Retired Member	Student Non -Member	Non - Member
Full Conference Rate: (inc accommodation)	£450.00 ☐	£200.00 ☐	£450.00 ☐	£650.00 ☐
Conference Rate: (no accommodation)	£145.00 ☐	£50.00 ☐	£145.00 ☐	£300.00 ☐
Conference Day Rate:	£100.00 ☐	£50.00 ☐	£100.00 ☐	£150.00 ☐

FEES BETWEEN 6 JUNE and 30 JUNE 2008	Full Member	Student, Honorary, Associate & Retired Member	Student Non -Member	Non - Member
Full Conference Rate: (inc accommodation)	£480.00 ☐	£230.00 ☐	£480.00 ☐	£680.00 ☐
Conference Rate: (no accommodation)	£175.00 ☐	£80.00 ☐	£175.00 ☐	£330.00 ☐
Conference Day Rate:	£130.00 ☐	£80.00 ☐	£130.00 ☐	£180.00 ☐

Conference Dinner (Please note that spaces are VERY LIMITED and will be allocated on a first come, first served basis): £50.00 ☐

Please tick the applicable box for the fees you are paying. If you are a Student (S), Honorary (H), Associate (A), or Retired (R) member, please enter the appropriate letter (S, H, A or R) in the box instead of a tick.

*ADD MEMBERSHIP TO YOUR BOOKING

Add Student membership (£25.00): ☐ **Add Full membership (£50.00):** ☐

YOUR DETAILS

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

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Please indicate any special dietary or other requirements on a separate sheet of paper

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STUDENTSHIP Application

Only ONE form per student please. If additional forms are required please photocopy this one

About this award

*Sf*AM offers Studentships to enable **student members** to attend Society meetings. These grants cover registration, accommodation, meals (where appropriate) and modest travel expenses. Preference is given to students offering a paper or poster and who have not previously received this award. To be considered for a Studentship grant, please complete this form in **BLOCK CAPITALS** and return it to the Society **no later than 6 weeks before the date of the meeting you wish to attend. Applicants MUST hold / have access to a legitimate UK bank account.**

Your details

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Address:_____

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

University or College:_____

Your Department:_____ **Position in Department:**_____

Grant authority:_____

Your intended career:_____

Your costs

Expected Travel Costs:_____

Other costs - please specify:_____

_____

Why do you wish to attend this meeting?

Please give your reasons:_____

_____

Your signature:_____ **Date:**_____

(If you need more space for your answer please continue on a separate sheet)

Will you be contributing by offering a Poster or presenting a paper? ☐ **Offering a Poster** ☐ **Presenting a Paper**

Your Supervisor's support

This section **MUST** be completed by your Supervisior or Tutor. Applications which are not supported by your Supervisor will be automatically rejected. **Please give your reasons why the applicant should receive a studentship:**

_____

_____

_____

Supervisor's name:_____ **Tel and extension:**_____

Supervisor's signature:_____ **Position:**_____ **Date:**_____

(If you need more space for your answer please continue on a separate sheet)

In signing this application I agree to reimburse the Society for any costs it may incur in awarding this grant should the applicant fail to attend the conference or fail to notify the Society of their inability to attend the conference within 14 days of the start of the meeting.

Please confirm your agreement by ticking the appropriate box: ☐ **I agree** ☐ **I do not agree**

Please return your completed application by fax or post to: **The Society for Applied Microbiology, Bedford Heights, Brickhill Drive, Bedford MK41 7PH, UK. Tel: 01234 761752. Fax: 01234 3288330. Email: meetings@sfam.org.uk**

Figure 1. *Annual rate of confirmed Campylobacter infections in England and Wales 1986 - 2007*

Table 1. Correlation matrix for *Campylobacter* densities in Morecambe Bay seawater and sediments with counts of wild birds

Type of bird	Seawater	Sediments
Wildfowl	**0.778***	0.269
Waders	**0.883***	0.396
Mixed gulls	-0.192	-0.451
Oystercatcher	**0.778***	0.265
Knot	0.513	**0.624***
Total birds	**0.856***	**0.321**

over 0.53 significant at *P<05

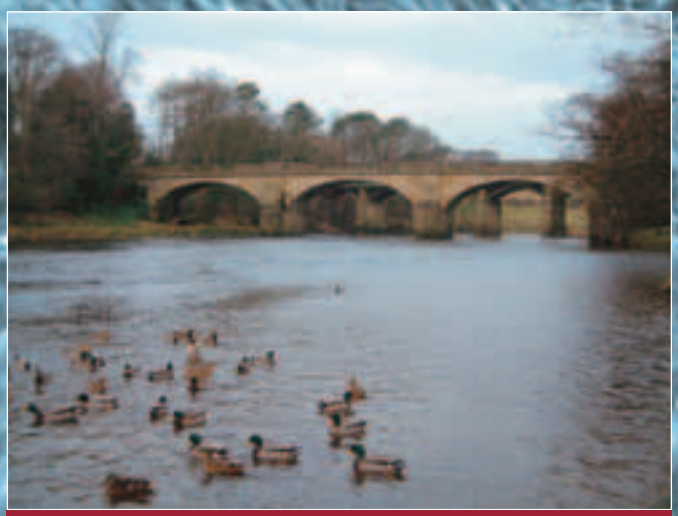


Figure 2a. *Ducks at the Crook O'Lune*

Figure 2b. *Cattle standing in river water*

Figure 3. *Seasonality of campylobacters and populations of wild birds in Morecambe Bay*

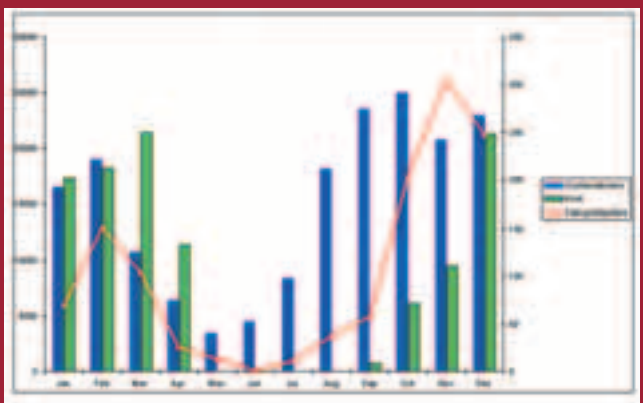


Figure 4. *Flock of knot with oystercatchers in foreground*

Campylobacter: is there a water connection?

Keith Jones looks at the routes of *Campylobacter* infection from aquatic habitats

Campylobacter infections continue to remain high in the UK (figure 1) and, although poultry and livestock are assumed to be the main source for humans, the environment, in particular water, has regularly been cited as a candidate source (Louis *et al.*, 2005; Michaud *et al.*, 2004). Is this true, and if so, what are the routes of infection?

Distribution and sources of campylobacters in water

Natural surface waters

Campylobacters have been isolated from marine and freshwater bathing waters, estuaries, rivers, lakes, ponds and streams (Jones 2001). Their presence is a sign of recent pollution as they cannot grow outside warm-blooded animals and they survive poorly in the environment. They are particularly susceptible to sunlight (visible and UV wavelengths) and high temperatures, with numbers significantly higher in the winter than the summer. In June and July natural populations of *Campylobacter* in seawater and river water survive for only a few minutes in daylight compared to five hours in December and January. In darkness, survival is up to 10 days at 20°C extending to 20 days at 4°C (Obiri-Danso *et al.*, 2001). Survival may be extended further by entry into the viable but non-culturable state (Oliver 2005).

Sources of *Campylobacter* for surface waters

Agricultural run-off from grazing livestock and farm slurries put to land is a significant source of campylobacters for surface waters. Studies from the UK and New Zealand show that rivers flowing though farmland become progressively contaminated with campylobacters from source to outflow.

Raw sewage contains large numbers of *Campylobacter*, which decrease incrementally with the level of treatment, with reductions of 78%, 79-100% and 100% for primary, secondary, and tertiary treatment, respectively. Sewage discharges into UK rivers are subject to at least secondary level treatment.

Surface waters are also contaminated with campylobacters shed by indigenous warm-blooded animals, such as rabbits, rats and mice, but the main contributors are livestock and wild birds. For example, freshwater bathing sites on the river Lune in Lancashire receive campylobacters from a combination of grazing sheep and cattle, farm run-off, secondarily treated sewage effluent, rodents and wild birds, particularly ducks (Obiri-Danso and Jones 1999a) (figure 2).

At Lancaster University we have worked extensively on bathing waters in Morecambe Bay. Initially, we thought that campylobacters in the Bay came from sewage effluent but now realise that the main source is wild birds. There are several reasons for this. Firstly, although the construction of a new sewage works and long-sea outfall significantly reduced the number of faecal indicators in the bay, it had no effect on the number of campylobacters, suggesting that there could be another source (Obiri-Danso & Jones 1999b). Secondly, a correlation matrix (table 1) calculated for the seasonality of campylobacters and populations of wild birds on the Bay (figure 3) shows that waders, wildfowl and oystercatcher are significantly correlated with the number of *Campylobacter* in seawater and knot are correlated with campylobacters in intertidal sediments. Thirdly, while *Camp. jejuni* is the predominant species in sewage effluent, the main species found in seawater is *Camp. lari*, which is shed by all the birds (oystercatcher, lapwing, gulls, godwits, knot, geese, shellduck and ducks) sampled in the Bay (figure 4).

Seasonality

It has been suggested that that water-borne campylobacters could be partially responsible for the pronounced seasonality of *Campylobacter* infections in humans (Louis *et al.*, 2005; Michaud *et al.*, 2004), but data for Lancaster shows that the seasonality of campylobacters in surface waters and the community do not coincide (figure 5 Seasonality of campylobacters in Morecambe Bay and the community).

Drinking water

Campylobacter has not been isolated from treated mains water, unless there has been an accident allowing faecal contamination. Nor has it been isolated from bottled water. It is readily isolated from reservoirs, less so from ground water and sporadically from private water sources, such as springs and boreholes. Reservoirs are susceptible to contamination by roosting birds, and ground water and private waters to rodents and agricultural run-off in wet weather. In a study of a large reservoir in Yorkshire we used biotyping of campylobacters to determine whether grazing sheep, immigrant Canada geese or black-headed gulls were responsible for pollution. The Canada geese and sheep excreted only *Camp. jejuni*, whereas the gulls excreted *Camp. jejuni*, *Camp. coli*, *Camp. lari* and urease positive thermophilic campylobacters (UPTCs), which was the same profile of species found in the water. Subsurface aquifers, which transport water from reservoirs and lakes to towns and cities, have the potential to transmit campylobacters in the same way as they have *Cryptosporidium*. Conditions in

aquifers, namely darkness and low redox potentials, low oxygen and year round low temperatures, favour survival of campylobacters (Stanley *et al.*, 1998).

Possible routes of infection — drinking water

The most direct route is via drinking water, however, there is no microbiological or epidemiological evidence for an association between tap water and campylobacteriosis. Louis *et al.*, (2005) suggest that there is a link between the source of treated water and *Campylobacter* infections. They showed that Wales and northwest England, which obtain 80% of their water supplies from surface waters, had higher rates of infection compared to south east England, which gets only 30% of its water from surface waters. Accidents occasionally happen with the drinking water infrastructure, and when they do there is the potential for very large outbreaks when such trusted sources become contaminated. An outbreak in a South Wales housing estate was attributed to a crack in a service reservoir that became contaminated by agricultural run-off (Richardson *et al.*, 2007).

Bottled water, on the other hand, has been identified epidemiologically as a risk factor for campylobacteriosis (Evans *et al.*, 2003), but there has been no confirmatory microbiological evidence. Recently, Tatchou-Nyamsi-König *et al.*, (2007) showed that *Camp. jejuni* added to natural mineral water grew in the presence of organic matter at 25°C. This is both interesting and surprising because it is the first report of multiplication of *Camp. jejuni* outside an animal host at temperatures below 30°C.

Health Protection Agency Reports regularly implicate private water supplies in outbreaks of campylobacteriosis. However, most associations are from epidemiological studies and microbiological confirmation is rare (Ethelberg *et al.*, 2005).

Drinking from untreated water supplies is reported to cause between 1.2 and 170 sporadic cases of *Campylobacter* a year / 100,000 people (Koenraad *et al.*, 1997) and is the cause of several outbreaks affecting hundreds of people (Thomas *et al.*, 1999). Several outbreaks have been caused by people drinking from 'clean' streams whilst enjoying outdoor pursuits (Aho *et al.*, 1989), apparently unaware that sheep and cattle may be active upstream (figure 6).

In hard water areas, and increasingly elsewhere, rainwater run-off from roofs is collected in water butts. This is potentially hazardous as the water may contain *Campylobacter* from the faeces of roosting birds (figure 7). It is advisable that the water is treated prior to use for drinking or washing hair.

Groundwater is assumed to be microbiologically clean and is widely used as drinking water for livestock. However, it can become contaminated with agricultural run-off and has been shown to contaminate poultry flocks. Generally, animals follow few rules when accessing drinking water and share their campylobacters willy-nilly (figure 8).

Irrigation

The World Health Organisation recognises the link between contaminated irrigation water and contaminated produce. Around 50% of UK crops are irrigated with untreated river water, but this does not appear to be a cause of human campylobacteriosis (Heaton & Jones 2008).

Figure 5. *Density of campylobacters in surface waters and Campylobacter infections*

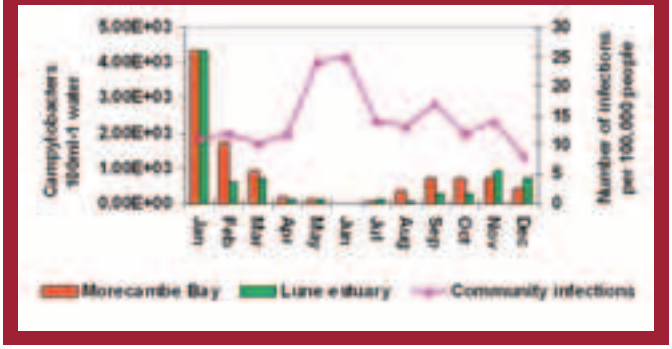


Figure 6. *Cattle in stream below Malham Tarn, a popular place for hikers*

Figure 7. *Roosting birds*

Figure 8. *Sheep in water trough used by cattle*

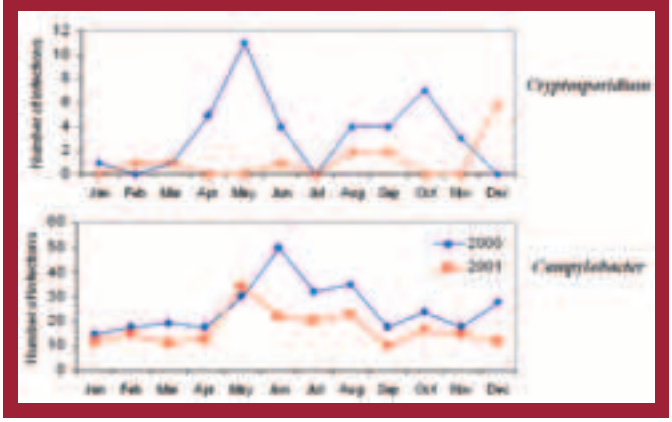
Swimming

Swimming in surface waters has been shown epidemiologically to be a risk factor (P=0.0145) for *Campylobacter* infections (Schönberg-Norio *et al.*, 2004). This study illustrates that you are more likely to get a *Campylobacter* infection by exposure to freshwater compared to seawater, because freshwater is contaminated with *Camp. jejuni*, which causes most human infections, and seawater is contaminated with *Camp. lari*, which causes very few (Jones 2001).

Comparison with *Cryptosporidium*, a waterborne pathogen

Campylobacter and *Cryptosporidium* share a similar seasonality with a major peak of human infections in late spring to early summer. Like *Campylobacter*, *Cryptosporidium* enters surface waters via the faeces of livestock and wild animals. Figure 9 shows the infection rates for both pathogens in north Lancashire and south Lakeland in 2000, which was a normal year, and in 2001 when the area was badly affected by a foot and mouth outbreak. During the outbreak, large numbers of cattle and sheep were slaughtered and the public were kept away from the countryside. The figure shows that *Cryptosporidium* infections were much lower in 2001 and in late spring the peak disappeared entirely. *Campylobacter* infections, on the other hand, were only slightly down and the spring peak persisted. This suggests that if there is an infection route from water to humans for *Campylobacter*, it is not the same as that for *Cryptosporidium*, a known waterborne enteropathogen.

Figure 9. *Effects of the 2001 foot and mouth outbreak on cases of Campylobacter and Cryptosporidium*



Conclusions

Campylobacters are ubiquitous in surface waters but absent from treated drinking waters. Human infections from water are much lower than from food and result mainly from accidents to water infrastructure, private water supplies and reckless behaviour whilst hiking. The routes of infection for campylobacters from aquatic habitats are unclear and await elucidation from molecular based studies, such as Multi Locus Sequence Typing. The role of water in transmitting pathogens, including *Campylobacter*, will form a large part of the Society for Applied Microbiology's summer conference on ***'Microbiology of water in work, rest and play'***, which will be held in Belfast in July, 2008 (see page 28).

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A cup of tea is the answer to everything — including the threat of bio-terrorism

Figure 1. A 48 hr culture of the Ames strain of B. anthracis (pXO1+, pXO2+). *Culture was grown at 30°C in air on a 5% sheep blood agar plate.*

Les Baillie looks at the beneficial physiological and pharmacological effects of tea and explores the antimicrobial properties of the Nations favourite drink

It was Marlene Dietrich who perfectly summarized the British obsession with tea in the following quote: *"The British have an umbilical cord which has never been cut and through which tea flows constantly. It is curious to watch them in times of sudden horror, tragedy or disaster. The pulse stops apparently and nothing can be done, and no move made, until 'a nice cup of tea' is quickly made. There is no question that it brings solace and does steady the mind. What a pity all countries are not so tea-conscious. World-peace conferences would run more smoothly if 'a nice cup of tea', or indeed, a samovar were available at the proper time."* (Dietrich, 1984).

Indeed, the importance of tea to the British psyche was acknowledged by the government during both the First and Second World Wars when active measures were taken to safeguard the provision of this essential morale-booster. Tea was even considered an essential element of the Red Cross parcels sent to British prisoners of war.

As a nation we currently drink 165 million cups a day of a beverage which for over 350 years has played a key role as a social lubricant underpinning the ordered running of our society.

Coffee was here first!

The British fascination with tea began in the 16th century when Portuguese and Dutch traders imported the beverage from Asia into Europe and by 1610 there were regular shipments of the then luxury item to England. A curious historical fact is that it was coffee houses which first introduced tea to the general populous. One of the first coffee house merchants to offer tea to the public was Thomas Garway who owned a cafe in Exchange Alley. He sold both liquid tea and dry tea in pouches to the public as early as 1657. In 1660 he advertised his wares as being able to make the body "active and lusty" and "preserving health until an extreme old age" and at £6 - £10 per pound, it most certainly was a luxury item. It became a popular drink in coffee houses, which were as much locations for the transaction of business as they were for relaxation or pleasure. However, coffee houses were the preserve of middle and upper-class men; women drank tea in their own homes, and as yet tea was still too expensive to be widespread among the working classes. In part, its high price was due to a punitive system of taxation. The first tax on tea in the leaf, introduced in 1689, was so high at 25p in the pound that it almost stopped sales. Indeed at one stage the tax on tea constituted 10% of the government's revenue!

Tea, the drink on which the sun never set

It could be argued that a major driver of the American Revolution and the loss of the colonies was the love of tea. The imposition of it's heavy taxation, often to finance foreign wars by the government, took the drink beyond the reach of the majority of ordinary working individuals. High taxation lead to a dramatic increase in smuggling and the illegal importation of tea had a massive impact on the profits of the East India Company, the only organisation legally allowed to import tea. Indeed it could be argued that its monopoly on tea was the means by which the East India Company gained control over vast areas of the Indian sub-continent and established the beginning of the British Empire. During the 1770s the East India Company ran into financial problems, and illegal tea smuggling into Britain vastly reducing the amount of tea being bought from the Company. This led to a down turn in profits, as well as an increase in its stockpile of unsold tea. In an attempt to revive its flagging fortunes and avoid bankruptcy, the Company obtained permission from the British government to export the surplus tea to the colonies. Permission was granted, and it was decided that the tea would carry a tax of 3d per lb, a levy considerably less that the duty paid on tea destined for the British market. When the Company's ships arrived in Boston in late 1773, the townspeople resolved that the tea should not be brought ashore nor the duty on it on paid. But the colonial administration would not allow the ships to leave port. The deadlock eventually resulted in the Boston Tea Party when a mass of townspeople, dressed as Native Americans, boarded the ships and threw the contents of 342 chests of tea into the sea. The whole affair took about three hours, and it was not a violent protest — the ships' crews attested that nothing had been damaged nor destroyed except the tea — and the protesters swept the decks clean afterwards. It is strange to think that a dispute over the price of a cup of tea was one of the key events that sparked off the American War of Independence.

The beneficial effects of a cuppa!

The restorative effect of tea may seem somewhat surprising when you consider that it contains little nutritional value *per se*. Its ability to elevate mood, decrease fatigue and increase the capacity to work is ascribed to the presence of caffeine. However, other components, most notably polyphenols, may also contribute to the restorative effects of tea and to its positive health related benefits. Tea drinking has been shown to have a wide range of beneficial physiological and pharmacological effects; it has been reported to have antioxidant activity, lower plasma cholesterol levels, protect from the harmful effects of radiation, inhibit the growth of cancerous cells and modulate cellular immune responses. Indeed tea extract has been shown to stimulate the intracellular antibacterial activity of murine macrophages infected with *Legionella pneumophila* (Matsunaga *et al.*, 2001).

In addition to indirect effects via immune cell modulation, tea extracts have direct antimicrobial properties. These are thought to be due to the presence of organic compounds in the leaves of the tea plant, which are involved in defense against invading pathogens, including insects, bacteria, fungi and viruses. Most commercially available teas come from the same plant, *Camellia sinensis*, but vary in their antibacterial properties depending on where they were grown and the manner in which the leaves are processed following harvest. Commercial teas are usually classified into three major categories; Green teas which are unfermented and contain polyphenols called catechins; fully fermented black tea as favoured by the British which contain, in addition to catechins, theaflavins and polymeric thearubigins generated during fermentation and semi-fermented usually black oolong, containing both catechins and theaflavins. The term fermentation when applied to tea is something of a misnomer, as the term actually refers to how much a tea is allowed to undergo enzymatic oxidation when allowing the freshly picked tea leaves to dry.

Tea has been shown to have a useful antimicrobial effect against a range of micro-organisms and have been shown to be active at concentrations identical to those found in a cup of tea. Bactericidal activity is though to be due to the disruption of the phospholipid membrane by galloylated tea catechins such as (-)-epigallocatechin-3-gallate- (EGCG) which result in the leakage of cell contents. Not surprisingly Gram positive organisms such as members of the *Bacillus* spp are more sensitive to EGCG than Gram negative bacteria. There is also evidence that tea polyphenols have a direct effect on the thermal resistance of bacterial spores, exposure of spores of *Bacillus stearothermophilus* and *Clostridium thermoaceticum* to tea reduced their resistance to temperature mediated killing (Sakanaka *et al.*, 2000).

In addition to directly targeting the microorganism, tea components have also been found to inhibit the biological activity of toxins. The potent neurotoxins produced by *Clostridium tetani* and the potential bio-terrorism agent *Clostridium botulinum* are inhibited by thearubigins which are generated in black tea during the manufacturing process. It is thought that they exert their effect prior to cellular uptake of the toxins (Satoh *et al.*, 2002a, 2002b). A similar mechanism is thought to account for the ability of EGCG to inhibit the *in vivo* activity of the lethal toxin, the major virulence factor of *Bacillus anthracis*, the agent employed to

lethal effect during the US postal bio-terrorism attacks (Dell'Aica *et al.*, 2004; Baillie 2005).

The antimicrobial effect of tea for *B. anthracis*

In light of the known antibacterial activity of tea and the ability of EGCG to inhibit the activity of the lethal toxin of *B. anthracis*, we sought to determine if English Breakfast tea, the staple beverage of the anthrax vaccine research team based at the Biodefense Institute, a part of the Medical Biotechnology Center of the University of Maryland Biotechnology Institute in Baltimore, was more effective than a commercially available medium roast coffee at killing *B. anthracis* (figure 1).

Vegetative cultures of the avirulent Sterne vaccine strain of *B. anthracis* (pXO1$^+$) were found to be considerably more susceptible to the inhibitory effects of English breakfast tea than coffee over a three hour period (figure 2).

Somewhat surprisingly, it was observed that antibacterial activity decreased as the concentration of the tea infusion increased, with a standard cup of tea (x1) showing the greatest activity. The failure of any of the tea infusions to completely inactivate all of the organisms in the time frame of the experiment was due to the presence of a small number of spores in the original inoculum. Indeed these results confirmed subsequent studies which found that tea had no direct antibacterial effect on the spore form of this organism. A similar pattern of antibacterial activity was observed when vegetative cultures of *B. cereus* ATCC 14579 and *B. cereus* G9241 were tested (figure 3).

On the basis of these results it would appear that the Sterne strain of *B. anthracis* shows greater resistance to the antimicrobial activity of tea and coffee than the *B. cereus* isolates included in this small study. These results are somewhat surprising given the close genetic similarity between *B. cereus* and *B. anthracis*. Its is unlikely that this reduced sensitivity is plasmid mediated as a plasmid deficient variant of the Sterne strain showed similar levels of sensitivity to both tea and coffee and *B. cereus* G9241 contains a homolog of the pXO1 plasmid.

The pot needs to be warm and the water boiling to make a decent cuppa!

It has been suggested that the widespread drinking of tea across the UK in the 17th century contributed to a reduction in the incidence of enteric diseases such as cholera and typhoid as a consequence of using boiling water to make the brew. While black tea at room temperature has no obvious antimicrobial effect on the viability of *B. anthracis* spores, the ability of tea polyphenols to reduce the thermal resistance of bacterial spores has been reported. Given that it is a rare individual that drinks cold tea we sought to determine if this was also the case for *B. anthracis*. As can be seen from figure 4, exposure to black tea significantly increased the antibacterial effects of heat for spores. These results support the importance of using boiling water to prepare a good cup of tea.

White or black tea?

Finally in acknowledgement of the fact that a substantial proportion of the population adds milk to their tea we determined its effect on the antibacterial effect activity of the drink (figure 5). Unfortunately the addition of whole milk to a

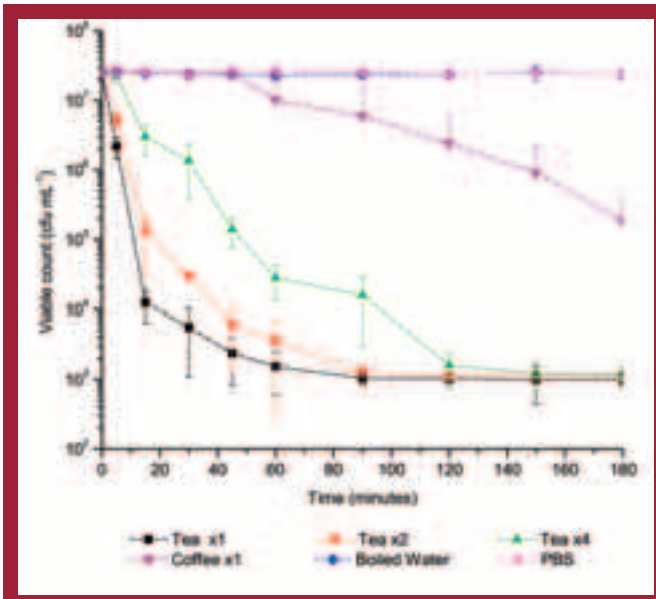

Figure 2. Survival of B. anthracis Sterne (pXO1$^+$) in infusions of commercially available English Breakfast tea and medium roast coffee. *Tea and coffee infusions were prepared at varying strengths; the strength of an average cup of the beverage (x1), twice the strength of an average cup (x2) and quadruple the strength of an average cup (x4). Triple washed bacterial cultures were suspended in filter sterilized infusions and samples were removed, neutralized and counted at set time intervals. Each assay was conducted in triplicate.*

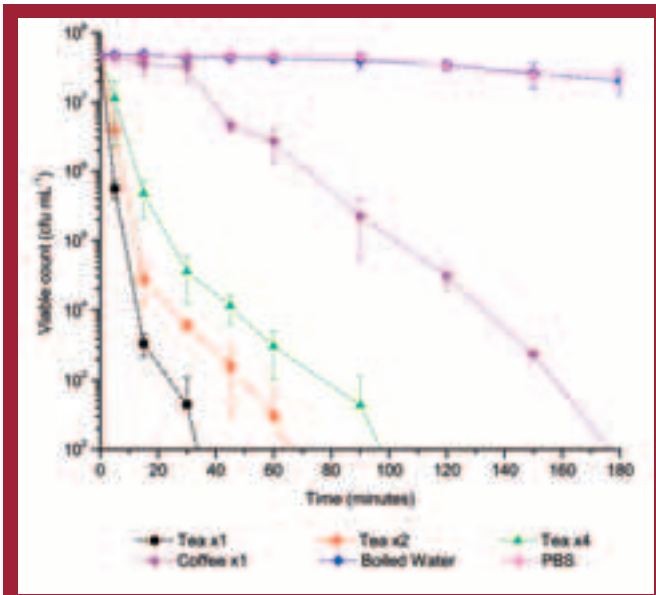

Figure 3. Survival of B. cereus ATCC 14579 in infusions of commercially available English Breakfast tea and medium roast coffee. *Tea and coffee infusions were prepared at varying strengths; the strength of an average cup of the beverage (x1), twice the strength of an average cup (x2) and quadruple the strength of an average cup (x4). Triple washed bacterial cultures were suspended in filter sterilized infusions and samples were removed, neutralized and counted at set time intervals. Each assay was conducted in triplicate.*

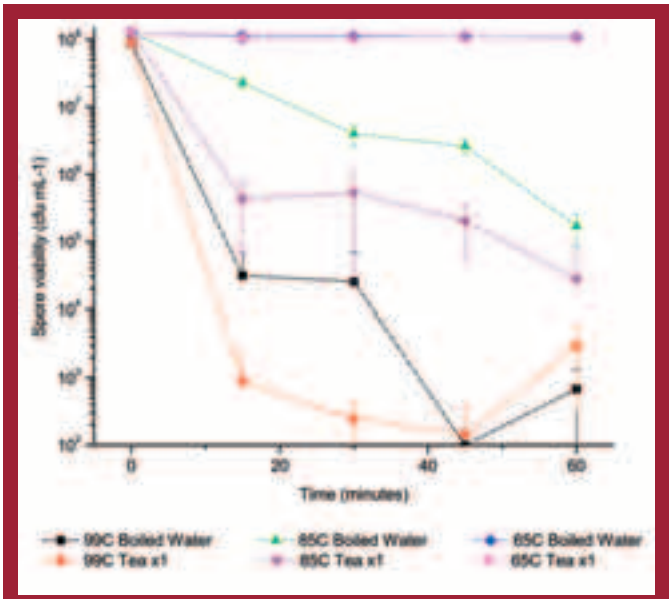

Figure 4. Thermal stability of B. anthracis Sterne (pXO1+) spores in infusions of x1 concentration of English Breakfast tea when heat shocked at 65, 85 and 99°C. *Spore suspensions were added to either x1 tea infusions or boiled water and heat treated for periods of 15, 30, 45 and 60 minutes. Samples were neutralized by addition of an equal volume of ice-cold neutralizer (30 % v/v Tween 80, 0.15% w/v L-Cysteine) and viable counts conducted. Each assay was conducted in triplicate.*

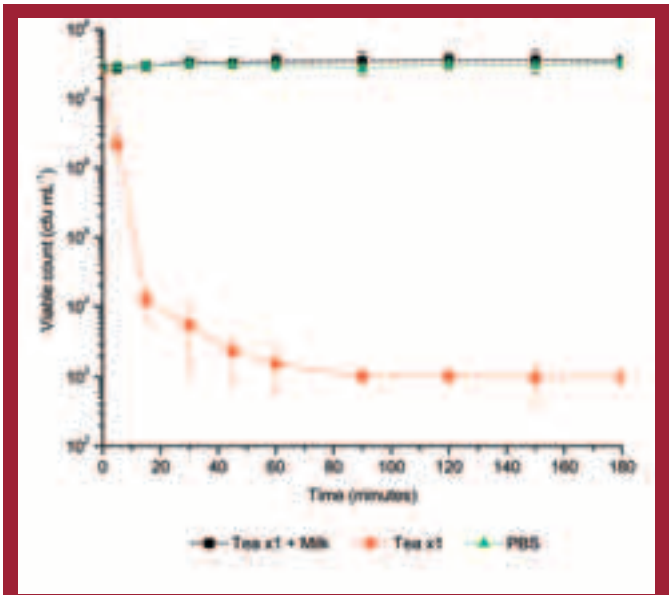

Figure 5. Survival of B. anthracis Sterne (pXO1+) in infusions of English Breakfast tea without milk and with the addition of 20% whole milk. *Tea infusions were prepared at the strength of an average cup of tea (x1). Bacterial cultures were suspended in either tea x1, tea x1 with the addition of whole milk (20% v/v), or PBS as a control. Samples were removed, neutralized and counted at set time intervals. Each assay was conducted in triplicate.*

standard cup of tea (20% v/v) completely inhibited its antibacterial activity against vegetative *B. anthracis*. Thus in the event that we are faced with a potential bio-terror attack I would suggest that individuals consider forgoing their dash of milk at least until the situation has been resolved.

Tea, the drink that revives and protects!

Concerns over the illicit use of micro-organisms such as *B. anthracis* against civilian populations have prompted a massive expansion in spending on measures to counter the threat of bio-terrorism. Since 2001 the US alone has expended over $44 billion on a range of defensive measures including the development of medical countermeasures. Given that it is likely to be several years before any drugs that emerge from this effort are licensed for human use perhaps our American cousins should consider the reintroduction of tea into their national diet. Given its ability to bring solace and steady the mind *and* to inactivate *B. anthracis* and its toxin perhaps the Boston tea party was not such a good idea after all.

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

The split-plot analysis of variance

Stat Note 12

In statnote 11 (Hilton & Armstrong, 2007), an investigator wished to study the influence of the material from which a dishcloth was manufactured (cloth or sponge) (Factor A) and the effect of rinsing the dishcloth in running water (Factor B) on the number of bacteria subsequently transferred to a food preparation surface (Hilton & Austin, 2000). The objectives of the experiment were to determine whether the risk of transfering bacteria from the dishcloth varied with the type of dishcloth and with rinsing treatment, and whether the two factors had an independent influence on the numbers of bacteria. Hence, there were four treatment combinations, i.e., two types of cloth each of which was either rinsed or not rinsed. This type of design is an example of the simplest possible factorial experiment and is also known as a 2^2 factorial, i.e., two factors with two levels of each factor. An important feature of the design of such an experiment is that the experimental subjects are assigned at random to all possible combinations of the two factors. In some experimental situations, however, the two factors are not equivalent to each other and replicates cannot be assigned at random to all treatment combinations. A common case, called a *split-plot design*, arises when one factor can be considered to be a major factor and the other a minor factor.

Scenario

A microbiologist was interested in the number of zoospores produced by the pathogenic aquatic fungus *Saprolegnia diclina*. The number of zoospores produced and their motility is markedly affected by such environmental factors as pH, oxygen tension, and the presence of biocides (Smith *et al.*, 1984). To examine the effect of pH on zoospore production and motility, parent colonies of *S. diclina* were placed at the end of experimental counting channels consisting of five sequential chambers (A to E). The channels were filled with sterile 5µm phosphate buffer and then modified to provide environments of either pH = 5.0 or 7.0. Zoospore activity within the chambers was determined by counting the number of encysted zoospores within each of the five chambers representing different distances from the parent colony. Each pH channel was replicated three times and sample data are given in table 1. This experiment also has two factors, *viz.*, variation in pH (5.0 or 7.0) and the distance zoospores travel along the channel from the parent colony (five positions sampled A to E). The problem that arises in this type of design is the dependence or correlation between the measurements made in the different chambers within the same channel. Hence, in this experiment, pH is regarded as the *major* factor being applied to the channel as a whole whereas distance along the channel is the *minor* factor representing the chambers or subdivisions of the channel. The obvious difference between this and an ordinary factorial design is that previously, all treatment combinations were assigned at random to replicates whereas in a split-plot design, replicates can only be assigned at random to the main-plot factor, *viz.*, the channels and not to channel/chamber combinations. In some split-plot designs, experimenters allocate replicates to major factors at random and then assign the levels of the minor factor at random within each major block. In yet other variations, the subplots may be divided further to give a split-split-plot design (Snedecor & Cochran 1980).

Statistical model

The model for a two factor split-plot design is:

$$x_{ijk} = \mu + M_i + T_k + e_{ij} + (MT)_{ik} + d_{ijk}$$

In this case, M represents main-plot treatments and T sub-plot treatments. The symbols 'i' and 'j' indicate the main-plots while 'k' identifies the sub-plot within a main-plot. The two components of error e_{ij} and d_{ijk} represent the fact that the error variation between main-plots (channels) is likely to be different from that between sub-plots (chambers). For example, one might expect there to be less natural variation when comparing chambers within a channel than different channels.

Analysis of variance

The resulting ANOVA (table 2) is more complex than that for a simple factorial design (Hilton & Armstrong, 2007) because of the different error terms. Hence, in a two-factor, split-plot ANOVA, two errors are calculated, the main-plot error is used to test the main effect of pH while the sub-plot error is used to test the main effect of chamber location and the possible interaction between the two factors. In the quoted example, there is a significant increase in zoospore production at pH 7.0 compared with 5.0 and a marked decline in numbers of zoospores with distance from the parent colony. In addition, there is a significant interaction term suggesting greater motility at pH = 7.0 (figure 1). The sub-plot error is usually smaller that the main-plot error and also has more DF. Hence, such an experimental design will usually estimate the main effect of the sub-plot factor and its

Table 1. Influence of pH on the production and motility of zoospores (number of encysted zoospores mm^2 24 $hour^{-1}$) of the aquatic fungus *Saprolegnia diclina*.

Major Factor	Major Factor	Replicates		
		1	2	3
pH = 5.0	Chamber A	3	4	5
	Chamber B	1	2	2
	Chamber C	0	0	1
	Chamber D	1	0	1
	Chamber E	0	0	0
pH = 7.0	Chamber A	20	18	23
	Chamber B	5	7	8
	Chamber C	3	4	5
	Chamber D	2	1	3
	Chamber E	2	1	2

interaction with the main factors more accurately than the main effect of the major factor. Some experimenters will deliberately design an experiment as a 'split-plot' to take advantage of this property.

A disadvantage of such a design is that occasionally, the main effect of the major factor may be large but not significant while the main effect of the minor factor and its interaction may be significant but too small to be biologically important. In addition, a common mistake is for researchers to analyse a split-plot design as if it were a fully randomised two-factor experiment. In this case, the single pooled error variance will either be too small or too large for testing the individual treatment effects and the wrong conclusions could be drawn from the experiment. To decide whether a particular experiment is a split-plot it is useful to consider the following: 1) are the factors equivalent or does one appear to be subordinate to the other and especially does one represent *subdivisions* of the other as in the chambers *within* a channel, 2) is there any restriction in how replicates are assigned to the treatment combinations and, 3) is the error variation likely to be the same for each factor?

Caution should also be employed in the use of *'post-hoc'* tests in the case of a split-plot design. *'Post-hoc'* tests assume that the observations taken on a given chamber are uncorrelated so that the subplot factor group means are not related. This is not likely to be the case since some correlation between measurements made in the different chambers of a channel is inevitable. Standard errors appropriate to the split-plot design can be calculated (Cochran & Cox 1957, Freese 1984) and can be used, with caution, to make specific comparisons between the treatment means. However, a better method is to partition the sums of squares associated with main effects and interaction into specific contrasts and to test each against the appropriate error (Snedecor & Cochran 1980).

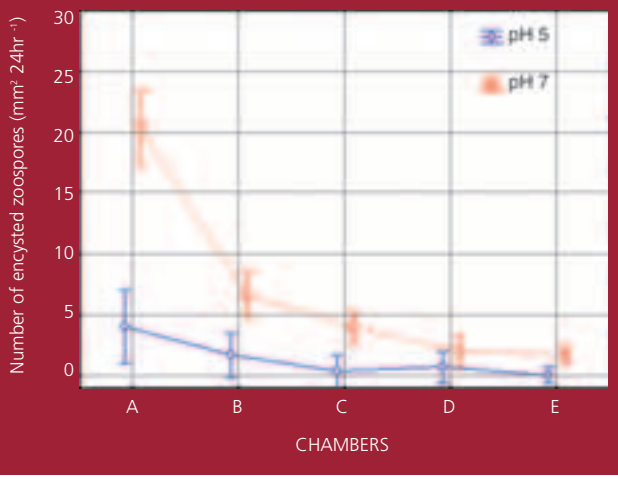
Another type of split-plot design is when the sub-plot factor represents measurements taken at different times on the same replicate. This special case of a split-plot design is known as a *repeated measures design* and will be discussed in the next statnote.

Table 2. Analysis of variance of data in Table 1

Source of variation	Term	Sums of Squares	DF	Mean square	F
Main plots (pH)	M_i	235.200	1	235.20	67.8*
Main plot error	e_{ij}	13.8667	4	3.4667	
Sub plots (chambers)	T_k	522.80	4	130.70	172.35**
Interaction	$(MT)_{ik}$	229.4667	4	57.3667	75.65**
Sub plot error	d_{ijk}	12.1333	16	0.7583	

*P<0.01, ** P<0.001

Figure 1. *Interaction between pH and distance traveled by zoospores down a channel*



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Anthony Hilton


Richard Armstrong

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Although he didn't graduate in Microbiology, **Alok Jha**, a science correspondent from the *Guardian*, was once a scientist by training. Here he gives us an insight into the life of a science journalist.

careers

Science Journalism

There are two sides to every journalist's job. The first involves the diary, a relentless treadmill of stories that starts every morning before 9am, when Editors huddle together to paw over lists of ideas collated together from pitches by their news reporters. This is the first of many different arenas through which a story usually passes, where it is first measured against the other events of the day and then given the go-ahead for possible inclusion in the next day's paper.

This list is also where a science story will first appear in the paper's schedule. It might be a journal article that is due to be published the next day, or details of a press conference or meeting that could produce interesting leads. The first few hours every day for a reporter are usually a tangle of phone calls and research to find out more about the stories they have promised their editors that day.

Meanwhile these editors spend much of the morning arguing over the relative merits of the stories on their slate. How much should a story get, where it should appear, whether it deserves to have a picture attached – all of these questions need careful consideration. Some choices will be clear-cut: a government announcement of a reform of schools, England playing in the football World Cup or a gruesome murder trial that has had the country gripped for weeks. But many others that seem to sparkle first thing in the morning never make it past lunchtime.

News moves continuously, evolving into something different even as you finish the first phone call of the day. A story will rise and fall in priority as its significance changes relative to other events of the day. A bomb in a faraway place or the assassination of a foreign President could disrupt everything, shifting your carefully constructed piece onto the dreaded pile of discarded stories.

Reporters are usually prepared for this tacit rejection, tentatively researching and beginning several stories in a day, perfectly aware that some of this carefully-crafted work might never make it into print.

At around 1pm, when there are just a few precious hours left before the deadline, the afternoon becomes a scramble to source quotes and finesse a story which, just that morning, began as nothing more than a couple of short conversations.

Running in parallel with the high-octane diary news journalism is a second, more rewarding enterprise. This type of reporting is about meeting and getting to know people, hunting out unique tales and doggedly investigating difficult subjects in the hope of uncovering some hidden truths.

Science journalism, like all journalism, is a combination of both of these things: the quick-turnaround stuff that's important to get right quickly but which can leave you breathless; and the slow-burn investigations that can often produce the best and most enduring

stories. My entry to this multiple-personality job came from a background in Physics. In the first year of my degree I quickly realised that writing music reviews for the college newspaper was a good way to get an endless supply of free CDs and gig tickets. But later I moved on to write news and features, and began to wonder if perhaps writing was some way that a proto-scientist could make a living.

Physics degree complete, I went on to study a Masters in Science Communication. The course took apart the rigid scientific view that I had of the world and I came to realise that, while it's useful to think like a scientist if you are one, it's impractical for journalists writing for general audiences.

But that's not the same as saying that having a science background is not a useful skill in journalism. Understanding how science works is immeasurably useful in working out the veracity of a story. Has something been peer-reviewed? Do the conclusions of a survey make statistical sense? What are the credentials of a researcher who claims he is being silenced by the scientific community?

Journalists have to deal with these sorts of issues almost every day, yet many have neither the tools nor the inclination to make sensible judgements. A scientific background can help journalists see more clearly.

Scientists often argue that journalists over-simplify their work. A journal paper or research project usually involves years of work by great big teams of people – how dare I write it up in just a few hundred words and not even mention their several dozen collaborators? Well, I dare for the sanity of my lay readers.

In a typical week I'll need to digest the goings-on in subjects as wide-ranging as astronomy or stem cells, work out what's new in both and then write the stories for people who doesn't know much about either.

And that includes scientists. If molecular biology is your thing, you're probably more focused day-to-day on the problems of differentiating embryonic stem cells than, say, working out the composition of dark matter.

Which means that, if there's an astronomy story in the paper, I'd bet you'd be more likely to read it if it explained a new idea simply and clearly, than if it were just a direct copy of the original scientific paper that requires footnotes to understand, lists the half-dozen collaborators on the project and gives a breakdown of which funding agencies paid for the telescopes.

My first reporting job was at a small policy newsletter based in London. I wrote news about higher education funding that was read by, probably, a dozen people every week. But in these formative years, I learned the basics of the reporter's craft.

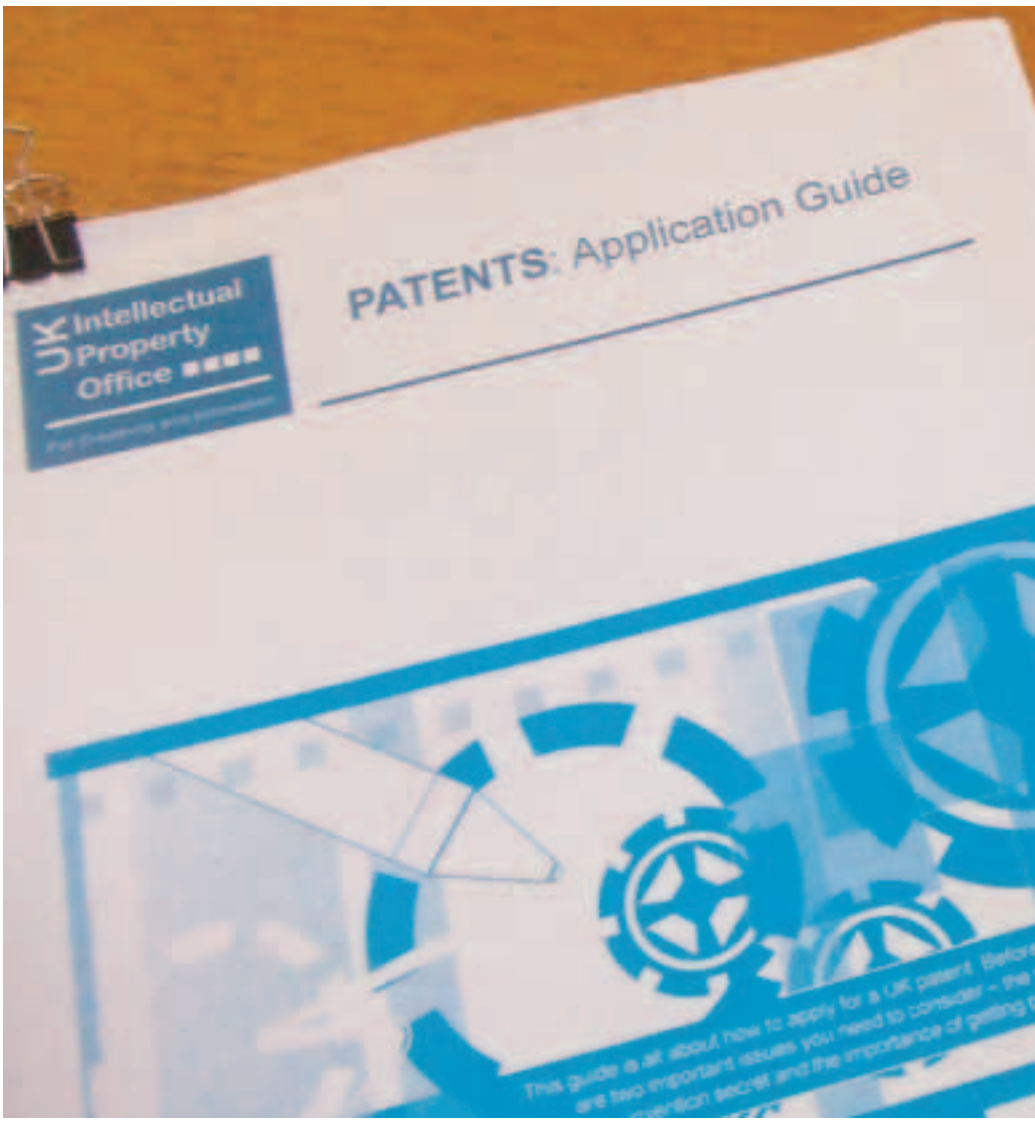
Those basics still guide what I do now: find a story that you think is interesting or novel, speak to the relevant people and quickly understand what they've done, shape what they tell you into a story that will entertain and inform your readers. Add a deadline of a few hours and you're a news reporter.

Alok Jha
Science Correspondent, The *Guardian*

From a PhD idea to..

In the loop pecs

News from the SfAM Post-Graduate and Early-Career Scientist Committee



I think it's fair to say that most people start a PhD for several different reasons and over the three or more years it takes to complete, these goals often change significantly. For me it boiled down to a three year job that involved interesting research and would hopefully increase my job opportunities.

During a PhD most students will hopefully aim to publish their work, as well as presenting work via talks and posters as a means of comunicating their findings to the wider community.

But there are alternative avenues that, although not always appropriate, should perhaps be considered. Most universities are now keen on disseminating research into industry. Unfortunately there are some key differences between the scientific community and the business world. For a technology to be viable it really needs to be patented which is a long and costly procedure, but without this there is nothing to prevent other company using your idea. A patent must be new technology therefore the early paper you published at the start of your PhD putting forward these new ideas will ruin any chance of patenting. This leads to a real problem: to publish is the way of the scientific community, but few businesses using a novel technology will succeed if they do not have exclusive rights.

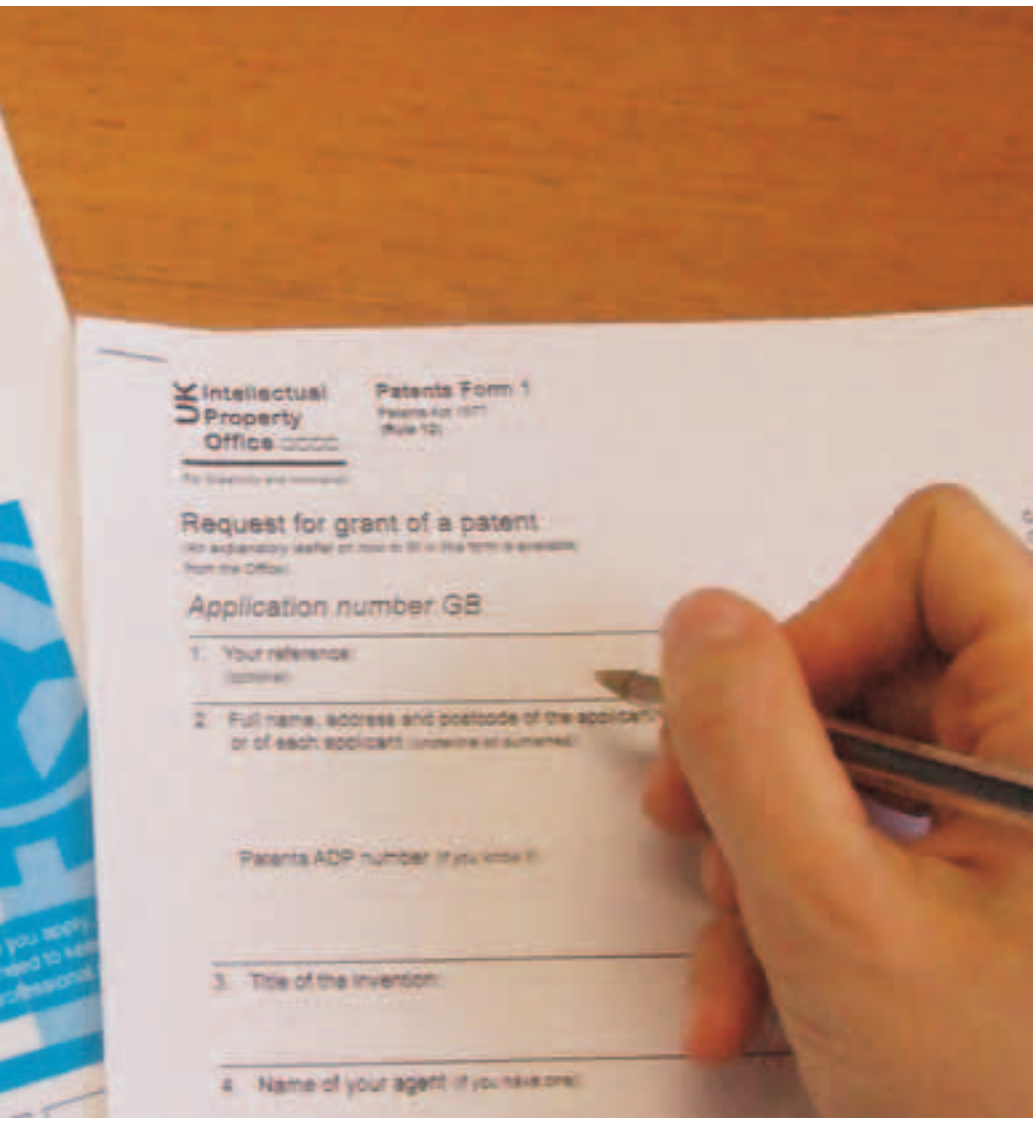
Many will say it's your duty as a scientist to publish and share your

Summer Conference

Calling all postgraduate and early-career scientists! This year's summer conference will include a special student session, focussing on career options for microbiologists. The PECS committee will also be organising a pirate-themed social event, so remember to pack your cutlass and eye patch and join us for what promises to be an enjoyable evening, with a prize for the best fancy dress. Anyone failing to attend *WILL* be made to walk the plank! See you all there.

Jo Heaton
Lancaster University

..a viable product



research, but all too often new technologies need significant investment to make them truly viable. If research grants are not sufficient, few investors will part with their money with no guarantees of return.

My three years have resulted in two international patents. The technology has brought in several short proof of concept projects as well as PhD and postdoctoral placements. I have learnt many new skills, from patent writing and presenting work to non-science based audiences to writing business plans.

One thing that should be accepted is that these kinds of ventures often take a long time to materialise, which may mean extended work after your PhD. Also there are no guarantees that any success will be forthcoming — many businesses fail at the early stages. Our successes have been in our flexibility in the basic research as well as expanding the horizons of the application of the research.

So have a look at where you research is really going and think about the potential opportunities or savings it could provide. If you have a novel idea push it and see where it goes… you never know.

Jeremy Wingate
University of Surrey

New PECS committee member: Vicki McCune

Vicki McCune, Health Protection Agency.

Vicki graduated from Newcastle University in 2004 with a BSc (Hons) in Medical Microbiology and then went on to study for a MSc in Forensic Science at the University of Teesside.

She is currently in the third year of her PhD at the HPA Newcastle laboratory, developing multiplexed nucleic acid-based techniques for the detection of foodborne bacteria. As the PECS Communications Officer, Vicki is always interested to hear from student members who are keen to write an article for this page. To get in touch email her at: **victoria.mccune@hpa.org.uk.**

get involved

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

j.heaton2@lancaster.ac.uk.

victoria.mccune@hpa.org.uk

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*.

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Analysis of *P. mirabilis* protease ZapA ability to regulate Protease Activated Receptors (PARs)

I was given the opportunity, thanks to a SfAM Students into Work grant, to work in the Biomaterials & Drug Delivery group at the School of Pharmacy, Queen's University Belfast under the supervision of Dr Brendan Gilmore. The aim of this project was to attempt to elucidate the potential role of the *Proteus mirabilis* secreted metalloprotease, ZapA, in the protease activated receptor (PAR)-mediated inflammatory response *in vivo*. The opportunistic pathogen, *Proteus mirabilis*, is commonly implicated in a number of urinary tract infections especially in patients with urinary tract complications such as chronic indwelling medical device instrumentation. Uropathogenic strains of *Proteus mirabilis* secrete a 54 kDa metalloprotease, known as ZapA or mirabilysin, which is regarded as an important virulence factor.

Like many bacterial metalloproteases, ZapA is a secreted protease which is implicated in a range of physiological and pathological events. ZapA has been extensively investigated and has been shown to degrade a broad spectrum of substrates. The potential activity of ZapA in nutrient acquisition is clearly demonstrated by its ability to degrade casein when grown on 3% Skimmed Milk agar (Figure 1), producing characteristic zones of clearance. In ZapA negative strains of *P. mirabilis* this caseinolytic activity is absent. Perhaps more importantly, however, ZapA exhibits lytic activity against numerous molecules involved in host defence including IgA (leading to its initial definition as an IgA protease), IgG, antimicrobial peptides such as the human defensins which are elevated in human urine during pyelonephritis, fibrin and structural components of host cells. Significantly, the ability of ZapA to efficiently degrade bradykinin, a bioactive peptide released during the inflammatory process has also been demonstrated, indicating a potential role of ZapA in the modulation of certain host defence responses.

Initially, wild type *P. mirabilis* (BB2000) and the ZapA knockout mutant strain *P. mirabilis* (KW360), both of which were kindly supplied by Professor Robert Belas, Biotechnology Institute, University of Maryland, Baltimore USA, were grown on Low Swarm (LSW-) agar. The strains were subcultured daily from LSW slopes and grown at 37°C. In order to detect the caseinolytic activity of the two strains, LSW containing 3% skimmed milk powder were prepared and inoculated. As can be seen in figure 1, the strain BB2000 produced distinct zones of clearance indicating caseinolytic activity whilst the ZapA knockout mutant strain exhibit no such activity. The wild type *P. mirabilis* was subcultured overnight and the ZapA enzyme purified according to the method of Wassif *et al.*, (1995). The human prostate cell line CRL 11609 which is known to express both proteinases activated receptor 1 and 2 (PAR1 and 2), was cultured in GIBCO Alpha Medium containing 20% foetal calf serum and keratinocyte supplement. The cells were subcultured and grown to ~95% confluency for use in a calcium biosignalling assay which uses a calcium indicator fluo-3 acetoxymethyl ester (Fluo-3 AM) to measure changes in intracellular calcium, as a result of PAR activation.

The cells were washed and disaggregated using enzyme-free cell

Figure 1

dissociation buffer and rinsed with calcium free PBS. Cells were resuspended in serum free growth media to a concentration of calcium biosignalling assay ~8 x 10^6 cells/ml. Cellular uptake of the calcium indicator was facilitated by gentle agitation for 25 minutes at room temperature, after which the free calcium indicator was removed from the cell suspension by repeated washing with calcium assay buffer. Changes in intracellular Ca^{2+} concentrations were analysed by measuring Fluo-3 AM fluorescence (excitation 480nm, emission 530nm) in real time. Cell suspensions were challenged with calcium ionophore calimycin, thrombin and trypsin as well as PAR1 and PAR2 agonist peptides. After establishing standard responses to activating proteases and ligands, cells were exposed to purified ZapA. ZapA treatments (0.5 -100 U/ml) did not cause activation of either PAR1 or PAR2. ZapA pre-treatment of cells did, however, cause a significant reduction in activation of PAR1 by thrombin and PAR2 by trypsin. This result is fascinating, since it seems to suggest that ZapA, aside from having a role in processing a wide variety of substrates including host structural proteins and antimicrobial peptides, has a much more subtle role in PAR disarming. *In vivo*, such a peptidase may therefore be involved in reducing the host inflammatory response and in *P. mirabilis* evasion of host defence mechanisms. Work is now ongoing with the laboratory to build upon these data and elucidate the functions of this fascinating peptidase.

The Students into Work project was an excellent experience, since the pharmacy degree is intensive and there is limited opportunity to develop applied laboratory skills, it has allowed me to gain experience working in a research laboratory. I have also had a chance to experience first hand the type of work undertaken by PhD students which was certainly an 'eye-opener' and very beneficial. This period in the laboratory has equipped me to make an informed choice of future career, which has been invaluable. I would like to thank my supervisor Brendan Gilmore for making it possible to take up this studentship and also to Stef McGrath and Dr Caroline McGoohan for all their help and guidance and for making the time in the School of Pharmacy enjoyable. Finally, I want to thank *Sf*AM for funding this work through their Students into Work Scheme. I cannot recommend this scheme highly enough to students who wish to gain first hand experience of working the dynamic research environment of a microbiology laboratory.

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Pauline A Conway

Studies on the growth of probiotic bacteria

During the Summer I had the pleasure of participating in a research project at Aston University thanks to the Society for Applied Microbiology Students into Work scheme. The aim of the project was to investigate the growth characteristics of bacteria isolated from commercially available probiotic products. Probiotics are products aimed at delivering living bacterial cells to the gut ecosystem of humans. They contain "friendly bacteria" which are claimed to protect us from "harmful bacteria" and play an important role in the digestion process. Probiotics are completely safe, even at 1000 times the normal daily levels of intake there are no reported serious side effects. The aim of my work was to investigate systems in which the isolated probiotic bacteria compete with normal gut bacteria in co-culture and for colonisation of surfaces. The longer term aim of the study was to investigate the biological activity of lipoteichoic acid produced by these "friendly" bacteria in a range of cell culture based assays for cytokine and nitric oxide production. This would show whether they have any to potential for inflammatory activity within the gut.

I began by isolating the major bacterial species from a number of commercial yoghurt-based probiotic products:

Bifidobacterium longum (Onken Natural Biopot)
Bifidobacterium sp.(Muller Vitality)
Bifidobacterium digestivum (Danone Activia Yoghurt)
Bifidobacterium lactis (Flora Proactive Drink)
Lactobacillus casei Shirota (Yakult)
Lactobacillus fortis (Nestlé Children's Drink)
Lactobacillus casei Immunitas (Danone Actimel Drink)

The seven strains of probiotic bacteria were grown on MRS agar in aerobic conditions at 25°C for two days. Only *Lactobacillus casei* Shirota and *Lactobacillus casei* Immunitas grew sufficiently well for further tests.

Both *Lactobacillus casei* Shirota and *Lactobacillus casei* Immunitas did not produce any anti microbial activity against *Escherichia.coli* and *Staphylococcus aureus.* I found that normal human serum does not contain antibodies to soluble factors produced by *Lactobacillus casei* Shirota and *Lactobacillus casei* Immunitas. *Lactobacillus casei* Shirota is sensitive to the following antibiotics trimethoprim, erythromycin and rifampicin whereas *Lactobacillus casei* Immunitas is sensitive to the gentamicin, erythromycin, rifampicin and ciprofloxacin. Both Shirota and Immunitas produce the antigen

lipoteichoic acid. Surface adhesion studies provided sufficient evidence to show that Shirota and Immunitas are capable of displacing *E. coli* and *Staph. aureus* from surfaces (glass and plastic).

Over the ten weeks in the Microbiology research Group's laboratories at Aston University I found the placement both interesting and challenging. I enjoyed all aspects of the project, but in particular, I enjoyed the successful planning and execution of experiments. I would recommend the Society for Applied Microbiology Students into Work scheme to anyone interested in Microbiology and to help gain laboratory experience. The scheme has given me a real insight into the world of Microbiology and has made me think about continuing my education to PhD level once I have graduated.

I would like to thank the Society for Applied Microbiology for giving me this great opportunity to gain valuable work experience, and to the team of dedicated researchers at the Aston University that I had the privilege to work alongside, for their guidance and support. Many thanks to Prof Lambert, PhD students Jess, Tarja and Laura, and special thanks to Dr Anthony Hilton, as without him this would not have been possible.

Zaheera Parveen

Characterisation of the LysM domain in *Helicobacter pylori*

***H. pylori* is a common human** enteric pathogen that colonises the surface of gastric epithelial cells. Untreated infections with pathogenic variants of *H. pylori* can result in the development of gastric disorders. Due to the rapid increase in the incidence of antibiotic resistance to currently used antibiotics, new therapeutic agents are required. Bacterial cell wall modification enzymes present an ideal target for the development of novel antimicrobial agents.

Bacterial cell wall synthesis, division, rearrangement and recycling are aided by lytic transglycosylases. This group of enzymes cleave the α(1-4) glycosidic bond between the two alternating disaccharide sugar residues (MurNAc & GlcNAc) of the peptidoglycan layer.

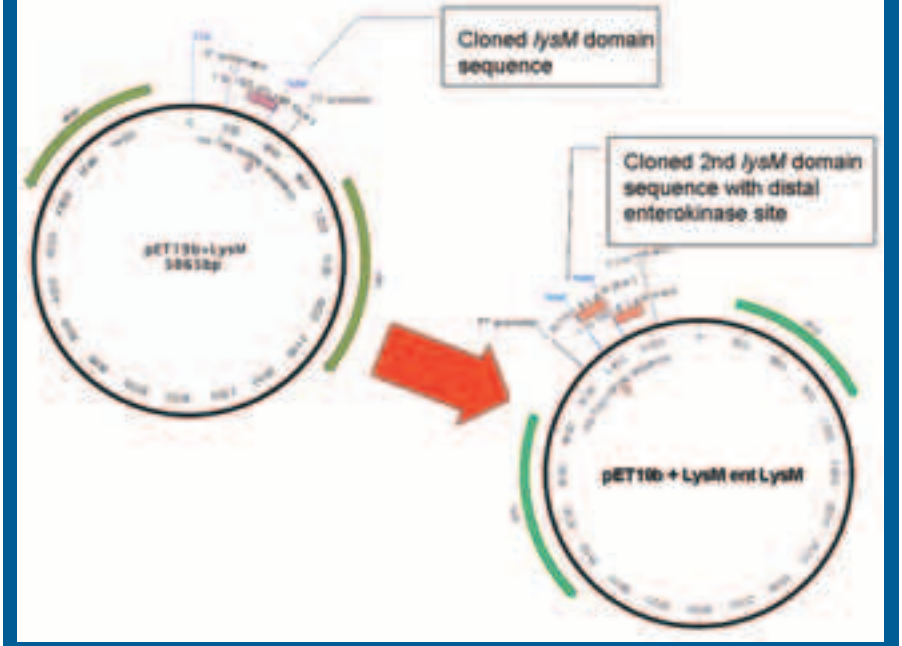

Figure 1. Characterisation of the LysM domain in *Helicobacter pylori*

Analysis of the *H. pylori* 26695 genome revealed two open reading frames encoding the putative lytic transglycosylases *htgA* and *htgB*. Recent study has shown that lytic transglycosylase deficient mutants of *H. pylori* were unable to colonise the gastric mucosa of mice. Therefore lytic transglycosylases of *H. pylori* have been identified as possible targets for these novel antimicrobial agents.

The *H. pylori* lytic transglycosylase B (HtgB) contains a putative LysM domain which was proposed to function in substrate binding. The *H. pylori* HtgB LysM domain could serve as a prime target for the inhibition of the lytic transglycosylase enzymatic activity. *In silico* analysis of the *H. pylori* HtgB lysM domain sequence revealed 34% sequence similarity with the previously characterised *E. coli* lytic transglycosylase D (MltD) LysM domain. In addition, the HtgB LysM domain contains a highly conserved aspartate/glutamate 11 residue which was proposed as a putative peptidoglycan binding site.

This study aimed to isolate and characterise the *H. pylori* 26695 lytic transglycosylase B LysM domain.

We have previously used PCR to amplify *H. pylori htgB lysM* sequence and clone it into the protein expression plasmid vector pET-19b. The construct was then transformed into the *E. coli* expression host strain BL21 [DE3] and expression was induced with IPTG. This was expected to generate a fusion protein with a poly-histidine peptide that allows detection and purification of the target protein. The expected molecular weight of the fusion protein was approximately 8kDa including a poly-histidine tag. Multiple attempts were made at detecting the synthesised LysM peptide using SDS-PAGE and Western Blot analysis. The target fusion protein could not be detected.

In this study an alternative approach was explored. It involved increasing the molecular weight of the fusion protein by duplication of the *lysM* sequence with an intervening cleavage site. Therefore, the size of the target peptide is doubled by cloning an additional lysM sequence (figure 1).

The construct was designed so that both *lysM* sequences are separated by an enterokinase site. This would allow for cleavage of the dimer peptide after expression to yield two identical LysM peptides.

PCR primers were designed which incorporated *NdeI* endonuclease restriction sites on both primers and an enterokinase site on the reverse primer. Two flanking *NdeI* restriction sites allowed for forced-end cloning of the insert into the vectors. The *lysM* domain sequence containing distal enterokinase site was successfully amplified.

Following multiple attempts the fragment was successfully amplified and subsequently ligated into the cloning vector pGEM T-Easy. The construct was sequenced to confirm the integrity of the reading frame. Due to time constraints the project was paused. Future work would include subcloning the second *lysM* sequence into previously constructed protein expression system and inducing it with IPTG to achieve adequate expression of the target protein.

Eugeny Semchenko

Identification of microbial populations responsible for cycling of dimethylsulfide (DMS) and related organosulfur compounds in soils

I was nearing the end of my second year studying Medical Microbiology and Virology at the University of Warwick and wanted to research the prospect of doing a PhD once I'd finished my bachelor studies. My personal tutor recommended the S*f*AM scheme to me and I believed that this would provide me with excellent work experience but also an important opportunity to sample the daily routine of modern research techniques.

I joined Dr. Hendrik Schäfer's group who specialised in environmental microbiology of volatile organosulfur compounds, particularly that of dimethylsulfide (DMS). I was intrigued to learn that major questions regarding microbial degradation of DMS — a climate cooling atmospheric trace gas — are still unanswered. Little is known about the identity of DMS degrading microbial populations in soils and their contribution to sulfur cycling in the terrestrial ecosystem. Although numerous bacterial strains that degrade DMS have been isolated and characterised (e.g. DeBont *et al.*, 1981, Suylen & Kuenen, 1982, Kanagawa & Kelly, 1986; Borodina *et al.*, 2000), the diversity of these species has not been analysed by culture-independent means previously.

The work I carried out during my S*f*AM summer project concerned identification of microbial populations responsible for cycling of DMS and related organosulfur compounds in soils. For this I used cultivation-independent methods, such as stable isotope probing (SIP), PCR and denaturing gradient gel electrophoresis (DGGE) of 16S rRNA encoding genes, as well as classical enrichment and isolation.

My work involved three objectives:

- The extraction of nucleic acids from soil samples of ^{13}C-DMS stable isotope probing experiments and from soil DMS enrichment cultures
- Analysis of ^{13}C DNA and ^{12}C DNA from the stable isotope probing experiments and of DNA from the enrichment cultures using PCR of 16S ribosomal RNA genes and denaturing gradient gel electrophoresis.
- Identification of microbial populations by sequencing of the denaturing gradient gel electrophoresis bands.

I hadn't heard of SIP prior to entering the lab and I was eager to learn the significance of this technique. To later discover that the SIP itself was formulated and pioneered in the lab that I was working in by Prof. J. C. Murrell (Radajewski *et al.*, 2000) made the entire project more stimulating.

As the project continued I realised how challenging lab work can be. I made good progress with fractionation of SIP gradients, DNA extraction, DGGE analyses of enrichment cultures and isolated two strains that had interesting new properties. However, the DGGE analyses of the SIP fractions proved to be very challenging and I was not able to finish this during the summer. This work continues to be investigated in the lab.

The techniques that I acquired will undoubtedly aid me in my third year projects, and hopefully allow me to pursue a career in microbiology. I previously had minimal experience within a lab and even less experience of working in an environment that was so focussed and determined. The meticulous preparation and exceptional patience required to conduct these investigations was very impressive and provided an excellent introduction into the motivation and enthusiasm that each researcher must have. I would sincerely like to thank S*f*AM for this chance to develop my skills and Dr. Hendrik Schäfer and Mr. Rich Boden for guiding and directing me to reach my results.

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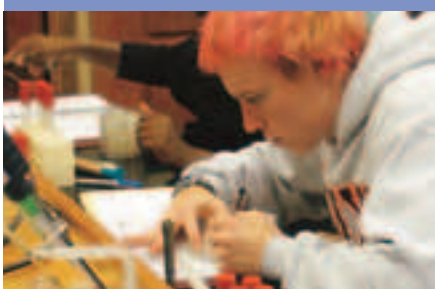
Svend Larsen



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Potential for use of natural antimicrobials for controlling mycotoxigenic moulds?

There is consumer pressure to reduce the use of aliphatic acid based preservatives used in intermediate moisture foods, especially bakery products. Consumers want more "natural" compounds to be used in their foods. Thus many essential oils and anti-oxidants have been screened for efficacy against spoilage micro-organisms. As evident in the existing regulations, propionic and sorbic acid based preservatives are most commonly used, while some anti-oxidants are also permitted in both food for human consumption and in other areas such as the cosmetics industry to extend shelf-life of products. Interestingly, while many essential oils have been screened as anti-microbials, they are not presently covered by the regulations. Our interest is in the potential for alternative compounds which can effectively control mycotoxigenic moulds. Since existing preservatives are predominantly fungistats, they must be used at the recommended concentrations. Recent studies on mycotoxigenic moulds suggest that use of sub-optimal concentrations can lead to a stimulation of growth as well as mycotoxin production in bakery products (Arroyo *et al.*, 2005; Magan *et al.*, 2006). Sometimes, effective control of germination or growth can be obtained. However, secondary metabolite production may be stimulated under such stress conditions. This has resulted in a significant interest in finding alternative more natural preservatives which may be able to substitute for existing preservatives specifically for controlling mycotoxigenic moulds in raw and processed food matrices, especially those based on cereals.

A significant amount of screening of a wide range of plant essential oils and anti-oxidants have been carried out for efficacy against mycotoxigenic moulds such as Aspergillus flavus (aflatoxin producer), *Penicillium verrucosum* and *Aspergillus ochraceus* (ochratoxin producers), *Fusarum species* (trichothecenes, fumonisins). Two approaches have been used in relation to food. Firstly, incorporation of essential oils or anti-oxidants into food products or secondly use of the volatile components of essential oils in food packaging systems for inhibiting growth and of mycotoxigenic moulds and extension shelf-life. It may also be possible to examine combinations of essential oils or anti-oxidants which may have a synergistic effect on inhibition of mycotoxigenic moulds. However, care is needed where spoilage moulds produce more than one mycotoxin. We have found that effective control of dexynivalenol production by some essential oils can result in a stimulation of others such as nivalenol by Fusarium culmorum (Hope *et al.*, 2003).

We have screened up to 25 different plant essential oils and five different anti-oxidants for efficacy against *P. verrucosum* and *A. ochraceus* and control of ochratoxin production *in vitro* on wheat flour-based media over a range of water availability conditions and temperatures. These suggested that only a few essential oils (clove, cinnamon, thyme) and some anti-oxidants (propyl paraben, resveratrol, butylhydroxy anisole) were effective. Subsequent studies were carried out on layers of wheat grain to examine effects on both growth and subsequent ochratoxin production. Based on these studies the effective doses (ED50) for the best chemicals were determined. This showed that resveratrol was more effective than the best essential oils in controlling growth as well as ochratoxin production. Subsequent studies were carried out with naturally contaminated wheat grain under different water availability conditions as well as that inoculated with *P. verrucosum* or *A. ochraceus* spores.

These studies showed that resveratrol was very effective at inhibiting ochratoxin production by these species in such stored grain systems. In bakery product systems studies with incorporation of essential oils have sometimes resulted in less efficacy because of binding to the food ingredients. This and the costs of essential oils need to be borne in mind when comparisons are made with existing preservatives. The use of volatile components may offer a good alternative approach as part of an active packaging system for slow

release of volatiles which can inhibit mycotoxigenic moulds. At the present time essential oils are predominantly being used as flavouring additives. Although no essential oils are acceptable specifically as anti-microbials under the current legislation, a side-effect of their use as flavourings may be to have some anti-microbial efficacy and also be beneficial in shelf-life of food products.

This article is based on a presentation made at the IUMS Food Mycology workshop in Cairns, Australia in august, 2006. I am very grateful to the S*f*AM for providing support which enabled me to attend this very useful and beneficial meeting.

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N Magan

Central venous catheter related infections: an overview

Hospitals acquired infections (HAI) are a major problem in health care. They account for an estimated 100,000 infections a year in England (9% of patients a year), are associated with high mortality and morbidity and add an extra 1 billion pounds cost to the health care system (National Audit Office, 2004). A contributing factor to HAI is the use of intravascular catheters, in particular central venous catheters (CVC). These are used for the intensive management of critically ill patients and are associated with approximately 87% of nosocomial blood stream infections. Other complications associated with the use of CVCs include localised trauma, haematoma, vessel perforations, air embolism, haemorrhage, thrombosis and infections (Worthington & Elliott, 2005).

Infectious complications associated with CVCs arise as they readily become colonised with microorganisms for example via impaction during catheter insertion, migration of microorganisms from the skin surface along the extraluminal side of catheter, via catheter hub during catheter manipulation or by injecting contaminated infusate. Furthermore CVCs may also become colonised via haematological spread of microorganisms from a distant site of infection. The main microorganisms associated with catheter related infections (CRI) are normal skin commensals, particularly *Staphylococcus epidermidis* and other coagulase negative Staphylococci. *S.aureus*, *Candida albicans*, *Acinetobacter spp.* and *Pseudomonas aeruginosa* are also associated with CRI but to lesser degree. The pathogenesis of CRI is due to the fact that many of the microorganisms particularly *S.epidermidis*, *S.aureus* and *C.albicans* become attached to the catheter surface and form a biofilm. Microbial biofilms can give rise to problems associated with treatment options due to the reduced penetration of antimicrobial agent into the biofilm.

Clinically, CRI may present as either localised or systemic infection, or both. Localised CVC infection presents as inflammation, pain and exudates at the catheter exit site and which resolves after catheter is removed. Symptoms of systemic CRI include low grade pyrexia (<38.5ºC), rigors and unresponsiveness to broad spectrum antimicrobial treatment. Bacteraemia may also lead to secondary infections such as abscesses and endocarditis, and to sepsis which may lead to multi-organ failure, which is associated with high risk of mortality. However, clinical diagnosis of CRI is often difficult as the symptoms, such as pyrexia, are non-specific and laboratory diagnosis is therefore needed to confirm the clinical suspicion. The most common laboratory tests for diagnosing CRI include blood cultures taken from peripheral vein and CVC simultaneously, which should ideally be tested quantitatively as well as qualitatively, and CVC tip culture if the device is explanted. To establish a definite diagnosis of CRI and to differentiate infection from sample contamination, identical microorganisms characterised by phenotypic and ideally genotypic methods should be recovered from all clinical samples (Casey *et al.*, 2007). Unfortunately, approximately 75% of CVCs are removed unnecessarily due to clinical misdiagnosis of CRI before the laboratory results are available.

Treatment of CRI includes antibiotic administration with or without CVC removal. Some microorganisms such as coagulase negative staphylococci may respond to intravenous antibiotic treatment, for example vancomycin, without the need for catheter removal. Antibiotic locks (where antibiotic is locked in the lumen of the catheter) instead of catheter removal have also been used to successfully treat CRI, especially with long term tunnelled lines. However, any antibiotic treatment should be selected following antibiotic susceptibility tests to reduce unnecessary antibiotic use and potential selection for resistant microorganisms in the hospital environment.

As for all infections, prevention of CRI is better than treatment. Adequate skin antisepsis prior to the insertion of the catheters and using aseptic technique including good hand hygiene during catheter manipulation are basic but essential preventive measures. The Centre for Disease Control (CDC) and Healthcare Infection Control Practices Advisory Committee (HICPAC) recommend the use of maximum sterile barrier precautions and use of 2% (w/v) chlorhexidine for skin disinfection prior to CVC insertion (O'Grady et *al.*, 2002). Furthermore proper care of the catheters such as cleansing and dressing the site post insertion is needed for preventing CRI; antibiotic impregnated catheter site dressings and sponges are available, however their use is only advised in areas with high risk patients and where CRI rates remain high after implementing other infection control measures. Furthermore, aseptic technique, including adequate hand hygiene, during catheter manipulation is

important as catheter hubs serve a potential port of entry for microorganisms. Needleless connectors as a replacement for catheter hub caps have been studied for preventing catheter related blood stream infections and their use is recommended by CDC. Antimicrobial impregnated or coated catheters are also available; chlorhexidine-silver sulphadiazine or minocycline-rifampin coated catheters have been shown in several clinical studies to reduce catheter related blood stream infections. Antimicrobial coated CVCs are recommended by CDC to be used in areas of high infection rate. As the microorganisms' attachment to catheter surface is enhanced by protein coating and thrombus formation, the use of anticoagulation such as heparin infusion in preventing CRI has been suggested however it is not recommended standard practice. Other recommendations for preventing CRI also include education of the health care workers for the insertion and care of the catheters and some experts highlight the importance of low patient: nurse ratios in the areas where CVCs are used.

Adequate skin antisepsis prior to catheter insertion is of paramount importance. Alcoholic skin disinfectant has rapid and broad spectrum of antimicrobial activity, however it has no residual antimicrobial activity. The most common skin antiseptic used prior to CVC insertion in UK hospitals is 0.5% (w/v) chlorhexidine in 70% (v/v) alcohol, however 2% (w/v) is now recommended by Evidence-based Practice in Infection Control Committee (EPIC) and CDC guidelines (Pellowe *et al.*, 2004). Unfortunately, many topical antimicrobial agents routinely used for skin antisepsis prior to invasive procedures are poorly permeated to the deeper layers of the skin and into the hair follicles, which harbour high number of microorganisms.

Novel antimicrobial agents or current antiseptics with enhanced skin penetration therefore need to be explored. Such agents may include natural compounds for example essential oils which are already widely investigated and commonly available. For instance tea tree oil is already widely used in hand and body washes and has been shown to be effective in eradication of MRSA. Other essential oils have also been studied for their antimicrobial activity and are used in food industry and many cosmetics and home care products. Current work within the Microbiology research laboratory at Aston University, UK, has shown essential oils including tea tree, lavender, eucalyptus, juniper, citronella and thymol to have excellent antimicrobial efficacy against a wide range of microorganisms commonly associated with CRI. Furthermore, the lipophilic nature of these compounds make them ideal agents for penetrating into the deeper layers of the skin. Enhancing the current antimicrobial agents' skin permeation and skin retention could be further investigated as to improve their activity in skin antisepsis. Perhaps the way forward in improved skin antisepsis is the use of current antiseptics for example chlorhexidine in combination with essential oil thus potentially providing dual antimicrobial activity and enhanced skin penetration. Further research is needed in this important area.

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Tarja Karpanen

The search for a comprehensive meningococcal vaccine

The Gram negative encapsulated diplococcus, *Neisseria meningitidis*, is a major cause of bacterial meningitis and septicaemia in infants and young adults. The rapid onset and progression of meningococcal disease, its high mortality rate and the debilitating sequelae among survivors, make the disease feared by both parents and clinicians. Given these features of meningococcal disease, prevention by vaccination is widely regarded as the most effective means of control.

Despite its fearsome reputation, the meningococcus more commonly adopts a commensal lifestyle, residing in the upper respiratory tract of around 10% of the population at any one time. It is therefore highly adapted for the colonisation of humans and has no other animal or environmental niche. Such adaptation has included the development of sophisticated mechanisms to enable it to evade the immune response. Although there have been notable successes, these mechanisms continue to challenge vaccine developers, especially in the development of a comprehensive vaccine capable of offering protection against all virulent meningococcal genotypes.

The capsular polysaccharide (CPS) represents a key virulence determinant and helps the organism to evade the immune response. Meningococci are divided into serogroups based on the immunochemistry of the CPS and most disease is caused by serogroups A, B, C, W135 and Y. Generally the CPSs are immunogenic in adults but poorly immunogenic in infants. Arguably, conjugate vaccines have been the most important vaccine development in recent times (Ravenscroft & Feavers, 2006). They consist of CPS chemically linked to an immunogenic carrier protein, such as the diphtheria or tetanus toxoids. Conjugate vaccines have a number of advantages over CPS alone including the ability to elicit protective immunity and immunological memory in infants, as well as to eliminate carriage of the bacterium. Following the introduction of conjugate vaccines in the UK in 1999, disease caused by group C meningococci has

largely been eliminated. Vaccines consisting of conjugated A, C, W135 and Y polysaccharide components are at an advanced stage of clinical development (Snape *et al.*, 2006; El Bashir *et al.*, 2006).

So far there are no vaccines that offer protection against all group B meningococci, which cause the majority of disease in most developed countries. The polysialic acid group B CPS is particularly poorly immunogenic in humans. This has been attributed to its similarity to glycosylated antigens on human cells; mimicry that has proved especially effective in enabling these organisms to evade host immunity. This mimicry also raises safety concerns over the use of group B CPS in a conjugate vaccine, as antibodies could theoretically target host cells.

A range of other meningococcal antigens are being investigated as potential vaccine candidates against group B organisms. In principle, a vaccine based on subcapsular antigens could protect against all virulent meningococci regardless of serogroup. Candidates include many of the cell surface molecules and structures of the meningococcus, such as outer membrane proteins (OMPs) and lipooligosaccharide (LOS – short-chain lipopolysaccharide). However, the more immunogenic of these structures exhibit antigenic diversity and/or phase variability, which enable the organism to evade host immunity and once again present a problem for vaccine design.

Effective vaccines have been used to control epidemics of group B disease in Norway, Cuba and, most recently, New Zealand. These vaccines are composed of outer membrane vesicles (OMVs), which are blebbed off from the surface of the meningococcus, and contain the same complex mixture of proteins as the bacterial surface. Since these vaccines are produced from the epidemic strain, the extent of meningococcal antigenic diversity means that their ability to offer cross-protection against heterologous strains is limited (Wedege *et al.*, 2003).

Various modifications have been made to OMV vaccines in attempts to improve cross-protection. Typically, these approaches involve the immunodominant and antigenically diverse PorA porin. In one approach cross-protection has been improved by the development of an OMV vaccine containing multiple antigenic variants of PorA (Dobbelsteen *et al.*, 2006). In a contrasting approach cross-protection has been increased by the preparation of OMVs from modified meningococci that do not express the immunodominant PorA but that over-express one of a number of less variable OMPs. Evidence from preclinical studies suggests that these OMVs may induce a more cross-protective antibody response (Weynants *et al.*, 2006). Another approach is to use OMVs prepared from *N. lactamica*, which, although antigenically similar to those of *N. meningitidis*, do not contain PorA (Gorringe *et al.*, 2005).

Vesicle vaccines are complex containing many potentially antigenic components, relatively few of which are immunogenic. The epidemiological surveillance of meningococcal disease, using molecular typing methods such as multilocus sequence typing and the analysis of the antigenic diversity of several of the immunodominant OMPs, provides evidence that the number of antigens that would be required to produce a cross-protective vaccine may be rationalised (Urwin *et al.*, 2004). As certain antigenic variants prevail in particular meningococcal genotypes, it is theoretically possible to formulate a multicomponent vaccine, containing a relatively small number of variants of a few immunodominant antigens, which would offer protection against the majority of virulent genotypes.

Recently, the availability of complete meningococcal genome sequences has provided a new approach for the identification of vaccine candidates. In so called reverse vaccinology, genes encoding potentially surface exposed proteins are identified in the genome sequence (Rappuoli, 2001). The less variable genes were then cloned and their protein products were over-expressed in *E. coli*. They were then tested in mice for their ability to elicit a bactericidal antibody response against meningococci. Clinical trials of a new vaccine containing five such antigens have produced encouraging results indicating that this approach may provide comprehensive protection (Giuliani *et al.*, 2006).

It is an exciting time to be working in the field of meningococcal vaccines and despite its challenges significant progress is being made towards the prevention of serogroup B disease. I would like to thank the Society for Applied Microbiology for the President's Fund grant which allowed me to attend the 15th International Pathogenic Neisseria Conference in Cairns, Australia where I presented a poster on the development of multiplex assay for the evaluation of protein-based meningococcal vaccines. This assay will aid the process of assessing the immune response to key antigens in complex vaccine formulations.

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Hannah Chan

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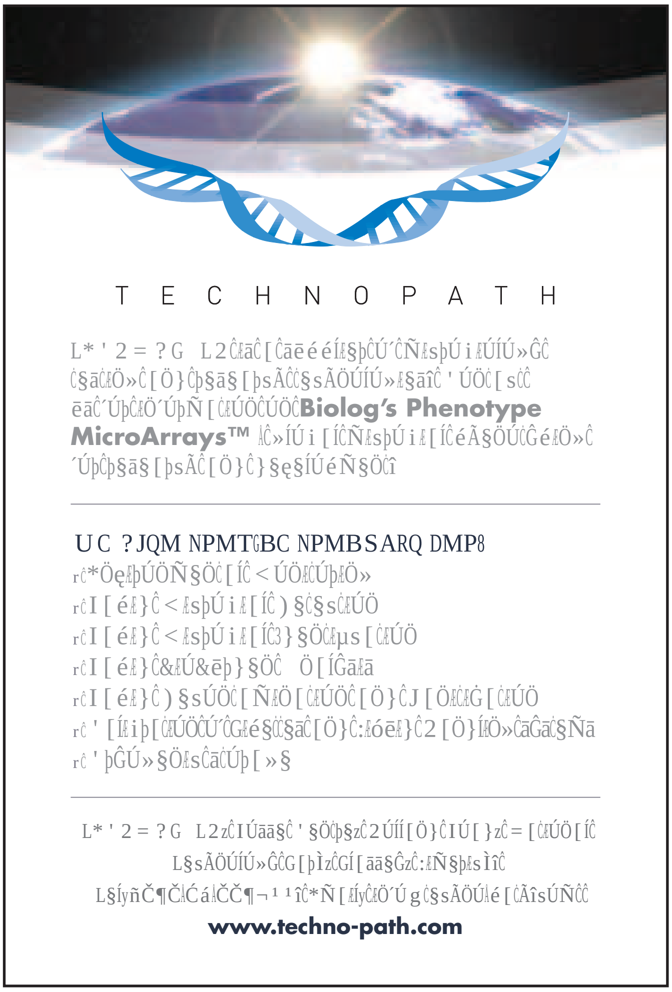
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New microbiological methods manual from CCFRA

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."

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Lanes 1, 2, 6 & 7; *S. aureus*
Lanes 3, 4, 8 & 9; *E. coli*
Lanes 5 & 10; no template control

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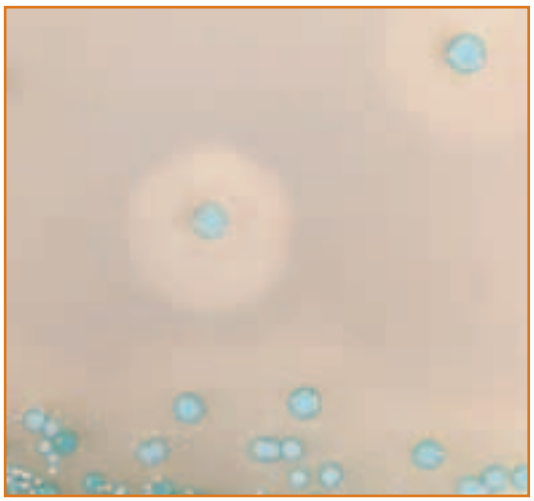

BLEB^{PLUS} a key product in Lab M's Listeria range

Lab M's range of microbiological culture media for the enrichment and isolation of Listeria species from food samples covers the requirements of FDA, ISO 11290 and USDA methods. Key products, including Buffered Listeria Enrichment Broth^{PLUS}, are available in a complete blend format, omitting the need for additional supplementation.

Customers following FDA methods can choose from Buffered Listeria Enrichment Broth^{PLUS} or Listeria Enrichment Broth^{PLUS}, both of which are designed for the selective enrichment of food and environmental samples for *Listeria* spp.

For the detection and enumeration of *Listeria monocytogenes* the recently introduced Fraser Broth^{PLUS} and Half Fraser Broth^{PLUS} give improved results over traditional formulations and meet all the specifications of the ISO 11290 standard.

Completing the Listeria portfolio are primary isolation media such as Harlequin™ Listeria Chromogenic Agar (ALOA Formulation also FDA recommended), and secondary isolation media including PALCAM Agar, Listeria Isolation Medium (Oxford) and LMBA.

further information

visit: www.labm.com
Tel: +44 (0)161 797 5729
Email: info@labm.com

Modern Media Preparation from Don Whitley Scientific

Manual media preparation can be one of the most tedious and time-consuming tasks in a modern microbiology laboratory. Purchasing pre-prepared plates or going through the process of rehydrating culture media manually may not be the most cost-effective or flexible options. There are also the ever-present risks of contamination, workflow variants and batch inconsistencies to consider.

The benefits of automation

Media preparators can be an essential aid to the busy laboratory for a variety of reasons. The uniform blending of ingredients is performed automatically providing homogeneous media, perfect every time. Media preparators also maintain optimised conditions to ensure sterile media is produced consistently. In many instances, the cost/time savings from using a media preparator means it can pay for itself in as little as 6 months. Of course, with no need for staff to be engaged in this time consuming process they are free to perform other, more productive tasks.

Pourer/stacker

Using an APS540 pourer/stacker with one of our media preparators means you can prepare up to 750 plates per hour with total uniformity and without any loss of quality. Our automated media preparators also include the facility to add blood or antibiotics during the sterilisation cycle.

Further information:

visit: www.dwscientific.co.uk
Tel: 01274 595728
Email: sales@dwscientific.co.uk

Prolex Staph Xtra

The latest addition to the Prolex line of rapid latex agglutination systems for the definitive, rapid identification of *Staphylococcus aureus* including MRSA. The kit utilizes the CM-MP technology from Pro-Lab Diagnostics giving increased sensitivity and specificity over conventional kits. Available in two convenient sizes, 100 tests and 300 tests, demonstrations are available on request.

Testoxidase, new from Pro-Lab Diagnostics for the rapid detection of bacterial cytocrome oxidase. Testoxidase® is adaptable to all traditional methods including the use of filter paper strips, discs, swab tips and plate flooding. It is stored at 'room temperature' allowing for the reagent to be readily available at all times on the bench, and is stable for '9 Months' from date of manufacture. Supplied in a 15ml dropper bottle, allowing for up to 350 tests, samples are available on request from sales coordination.

further information

visit: www.pro-lab.com
Tel: +44 (0)151 353 1613
Email: uksupport@pro-lab.com

Major Veterinary Centre Installs 16 ProtoCOL Automated Inhibition Zone Sizing Systems

Synbiosis is pleased to announce that the Veterinary Laboratories Agency (VLA) has chosen to install sixteen specially customised ProtoCOL automated colony counting and zone sizing systems. The systems which will be sited at every VLA unit across the UK, will be used to speed up testing of veterinary antibiotics for therapeutic use and to collect and monitor zone size data for surveillance purposes. The VLA ProtoCOL systems, which consist of a computer controlled, high-resolution CCD camera integrated with image analysis software, can read an entire plate, including measurement of inhibition zones and transcription of results, in minutes.

The software included with the VLA ProtoCOL is so well designed it can measure inhibition zones with a resolution better than 0.05mm from the edge of an antibiotic disc to automatically produce data on the zone size only. This will save time because scientists will be able to perform tests with different antibiotic disc sizes on one plate without having to measure and subtract disc diameter sizes from their calculations. The VLA ProtoCOL is fully GLP compliant, with the data generated automatically transcribed into Excel or transferred to the VLA LIMS system to allow results to be safely stored or statistically analysed.

further information

visit: synbiosis.com
Tel: +44 (0) 1223 727125
Email: sales@synbiosis.com

Southern Group Laboratory (SGL) have just released, their new 2008 UK Price List and Product Guide

The new Product Guide provides comprehensive details of the extensive range of ready prepared microbiological culture media, stains and reagents manufactured by SGL for a wide range of industry sectors such as:

- Healthcare Services
- Hospitals/ Pharmacies
- Food Companies
- Water Companies
- Contract Laboratories
- Pharmaceutical Companies
- Cosmetics Companies
- Research & Education Establishments

Please contact us to request your free copy.

further information

visit: sglab.co.uk
Tel: +44 (0) 1536 403815
Email: info@sglab.co.uk

Corporate members may publish up to 200 words on a topic related to their field of activity in this section. For further information please email **lucy@sfam.org.uk**

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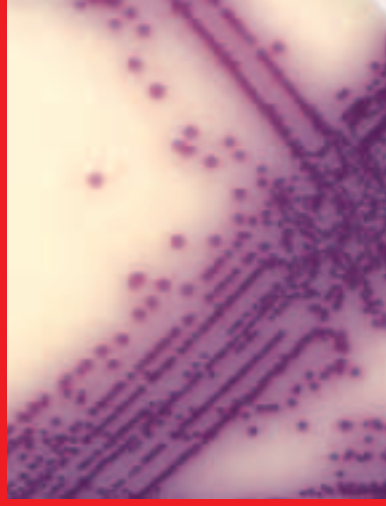

INNOVATION IN FOOD MICROBIOLOGY

Inhibigen™ Technology:

A NEW DIMENSION IN SELECTIVE MICROBIOLOGY

Oxoid has developed a unique, new class of selective agents known as Inhibigens™. When added to a culture medium, these molecules provide highly specific selectivity and allow improved recovery of often stressed target organisms.

Inhibigen™ technology, which is currently subject to a patent application, involves the use of an inhibitor molecule linked to a specific substrate. In this bound state, the inhibitor is non-toxic - however if taken up by a cell and cleaved from the substrate, the inhibigen molecule will prevent the organism from replicating. Only organisms with the required uptake mechanism and specific enzyme to cleave the inhibitor substrate complex will be affected. This allows very specific inhibition of competing, non-target organisms.

Unlike conventional selective agents, such as antibiotics, Inhibigens™ can be engineered to have no inhibitory effect on the target organism - even when the cells are stressed. This means that recovery of specific organisms is improved in two ways - by reducing the growth of competing flora and by minimising exposure to potentially inhibitory components.

Oxoid Salmonella Chromogenic Medium Mark II (OSCM II) is the first ever selective culture medium to incorporate Inhibigen™ technology, combining it with familiar chromogenic technology to provide excellent isolation and identification of *Salmonella* colonies.

The R&D team responsible for Oxoid's new Inhibigen™ technology

The Inhibigen™ used in OSCM II specifically inhibits the growth of *E. coli*, a common competing organism in *Salmonella* investigations, whilst novobiocin and cefsulodin at carefully selected levels, inhibit the growth of other competing flora, such as *Proteus* and *Pseudomonas*. Two chromogens are also added to the medium, allowing the differentiation of *Salmonella* colonies (bright purple) from other organisms, such as *Klebsiella* and *Enterobacter* (blue).

The combination of these principles makes it easier to identify *Salmonella* colonies and reduces the number of false positive results requiring follow-up investigations. With OSCM II you can experience a new level of efficiency in your laboratory. For more information please speak to your local Oxoid representative or contact Val Kane, Oxoid Ltd, on 01256 841144, email: val.kane@oxoid.com

Inhibigen™ technology - a new dimension in selective microbiology.

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