Microbiologist

The magazine of the Society for Applied Microbiology ■ Sept 2005 ■ Vol 6 No 3

illustration: Robert A Thom

Childbed Fever

How a Yorkshire doctor beat Semmelweis to the true cause of puerperal fever

ALSO IN THIS ISSUE:

- 2006 January Meeting Programme
- Med-Vet-Net - approaching its first year
- Fungi in your shopping basket
- 2005 Summer Conference report

Dr Margaret Patterson appointed new Honorary President of the Society

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MEETINGS

WRITE FOR US!

The editor is always looking for enthusiastic writers who wish to contribute articles to *Microbiologist* on their chosen microbiological subject.

For further information please email:
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FEATURES

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Website: the society website 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.

www.sfam.org.uk

Editorial

HERE IN THE SfAM OFFICE we've all been extremely busy over the last three months. The society has gone through a period of great change in recent times. Not only do we have a new president of the society, Dr Margaret Patterson, but we also have two new members of committee who will introduce themselves in the next issue of *Microbiologist*.

In this issue of the magazine we say a fond farewell to our previous president Dr Peter Silley. We all know what great work Peter has done for the society, and some of the Officers of the Society tell us about his work and entertain us with some slightly more personal anecdotes about their experiences of working with Peter. We also extend a warm welcome to Dr Margaret Patterson, the fourth female president of the Society. As such Margaret will undoubtedly be a great role model for all our members. She introduces herself here and talks a little about her career and the fact that science and microbiology in particular is such a great career.

Since the last issue was published we've had our annual general meeting and summer conference at the Old Ship Hotel in Brighton—which those of you who joined us will know was a great success. In this issue there is a comprehensive report on the meeting on page 33 which I'm sure will prove very interesting reading for those of you who couldn't make it.

Our feature article for this issue by Milton Wainwright unearths the truth behind the discovery of the cause of Childbed fever (page 26). I find it fascinating when such investigations reveal something that might re-write the history books. When we learn that someone we'd all assumed to have made a discovery was actually several years behind a name we barely recognise. For those of you who are interested in the history of Microbiology, you might like to do some digging yourselves as we have a couple of history-related items with which we need your help.

Firstly, our archivist, David Post needs the help of all members. Intensive work on sorting the society archives has shown that they are far from complete. Members, especially long-standing ones, may be keeping material that is of interest in recording the history of the society. Such items as minutes, meetings reports, journals, letters and indeed anything pertaining to the Society and its

predecessors, the Society for Applied Bacteriology and the Society for Agricultural Bacteriology would be very welcome if members could bear to part with them to a good home! If you can help then please contact David Post either through the SfAM office, or on 01424 870590.

The second item which we are all very excited about, but which requires the help of all of you is the 75th Anniversary competition. To celebrate 75 years of the Society for Applied Microbiology we are running a writing competition to find the most interesting, entertaining and informative article describing an historical event in Microbiology. We are looking for 500-700 words of your opinions, thoughts or memories of a famous microbiological breakthrough, historical event or a personally significant tale. The only other rules of the competition are that the article is microbiological in nature and that it is based upon an event of the last 75 years. So, for all you writers out there like Milton Wainwright who have witnessed or are merely fascinated by a particular Microbiological breakthrough or event of the last 75 years, then see page 7 and send in your entries to me.

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MEDIA watch

In a new feature of *Microbiologist*, we bring you the latest Microbiological news coverage from the media around the world.

Scientists find cure for smelly breath.
A paper published in *Environmental Microbiology* in August 2005, a journal which SfAM publishes jointly with Blackwell publishing, has generated much media interest. Articles have appeared on the BBC website (see link below), the CBS news website, *Fox News* and the *Washington Times*. On Thursday 4 August the author of the paper, Dr Ann Wood appeared on the Radio 4 programme *'Material World'* with Quentin Cooper. To read the story see http://news.bbc.co.uk/1/hi/health/4719123.stm.

Other Microbiology-related stories which have hit the headlines include:
Bacteria levels close two beaches, *Seattle Times* Saturday, 30 July, 2005. http://seattletimes.nwsource.com/html/eastsidenews/2002410972_glance30e.html

Deadly sense of bowel bacteria, *The Times*, 29 July 2005 http://www.timesonline.co.uk/newspaper/0,,174-1712658,00.html

Bacteria link to farm deaths, *The Scotsman*, 25 July 2005 http://news.scotsman.com/international.cfm?id=1677022005

A new understanding of how immune system targets disease, *Medical News Today*, 27 July 2005. http://www.medicalnewstoday.com/medicalnews.php?newsid=28120

New test detects pathogens in minutes, *New Scientist*, 18 July 2005. http://www.newscientist.com/article.ns?id=dn7690&feedId=online-news_rss20.

SfAM WEBSITE www.sfam.org.uk

Have you visited the SfAM website lately? As well as keeping you up-to-date with SfAM news and activities, it offers full SfAM members many other services. If you are a Full Member or Full Student Member, log on, using your SfAM username and password, to:

- advertise microbiology job opportunities (free!)
- post your CV (free!)
- advertise your microbiological skills or consultancy (a small annual fee is required)
- take part in the Discussion Forum

Have you forgotten your username and password? Go to the website and click on 'Services' - 'Member Log on' and then follow the instructions on that page to have your username and a new password emailed to you.

Don't miss out on our wide range of grants, including our newest grant, the SfAM Fellowship. Details and application forms can be found at:

www.sfam.org.uk/members/prizes.php

Coming soon – online booking for the 2006 January Meeting. You'll find the complete programme online and on page 21 in this issue of *Microbiologist*.

75th Anniversary Competition

The winner of last issues micro break Word Puzzle was **Professor Maurice O'Moss** of Surrey who receives a £30 book token by solving the word puzzle. The correct sentence was:
'FREE AGAR PLATES FOR SCHOOLS CAN CAUSE AGGRAVATION'

This issues Micro break is our **75th Anniversary competition**. Next year will mark the 75th Anniversary of the Society for Applied Microbiology. To celebrate we are running a writing competition to find the most interesting, entertaining and informative article describing an historical event in Microbiology. We are looking for 500-700 words of your opinions, thoughts or memories of a famous microbiological breakthrough, historical event or a personally significant story The only other rules are that your article should be microbiological in nature and based upon an event that occurred within the last 75 years.

A panel of judges will then sift through the entries and choose the winner, who will receive a bottle of the finest champagne and have their article published in *Microbiologist*. Three runners up will also see their work feature in the *Microbiologist* during our anniversary year. To enter, simply fill in the registration form below and send it to us together with your article before the closing date of **Friday 18 November 2005.** Good Luck!

The closing date for entries is **Friday 18th November 2005**. The winning entries will appear in ***Microbiologist***.

Forename: _____ Surname: _____

Address: _____

_____

Title of your article: _____

_____

Simply photocopy this page and send it to: '75th Anniversary Competition', Society for Applied Microbiology, The Blore Tower, The Harpur Centre, Bedford MK40 1TQ, UK. **Remember, you could win a bottle of champagne!**

We interview **Dr Margaret Patterson**—the Society's new Honorary President

SHE WAKES UP AT 5.45 am to the sound of Jimmy the African Grey Parrot squawking his morning greeting and goes downstairs in her farmhouse to feed him (he's awake from the crack of dawn until dusk—so at this time of year that's a long time). Born and raised on a small dairy farm just outside Belfast, she has just recently returned to live in the family home. This is Margaret Patterson, new president of SfAM; the fourth female president of the Society. She's a friendly and extremely organised woman; she has to be with the hectic work schedule she manages so well. Here she introduces herself and talks about her vision for the Society.

Educated in a very small, local primary school (only two teachers!), then at a Belfast Grammar school and Queens University Belfast, Margaret was a teenager during the Troubles. This meant that she could not go out much at night and tended to stay within the local, tightly knit and very happy community. She firmly believes that Northern Ireland is a great place and although she has travelled extensively, still calls it home and has not found anywhere else she would rather live. As she told us: "Hopefully the terrorist activity has gone for good now so why not come and see it for yourself?"

She was always better at science than arts at school and wanted to know how things worked. "This was much easier than learning lots of historic dates and quotations from literature," she says. This, along with a passion for food, made a degree in Food Science an obvious choice. "I wanted to know things like how they get the yolk into a Cadbury's cream egg, figs into fig rolls and why liquid milk ends up as cheese, butter and yoghurt."

After graduating she was given the option of taking a job with a well-known food producer or, as advised by her then Head of Department Professor John Murray (a former President of SfAM), continuing her studies and choosing a more academic path. It was the academic life that most appealed and after leaving 'the Island of Ireland' for the first time and heading to Australia for three months (she never was the type to do things by halves), she began her postgraduate studies on mycotoxin production in foods. She then spent two years as a post doctoral fellow in the Department of Microbiology and Immunobiology at the Royal Victoria Hospital, Belfast. Here she worked on evaluating new antibiotics for the treatment of MRSA, which even in 1984 was causing problems in the Special Care Baby Unit.

Currently Margaret holds a joint appointment with the Department of Agriculture and Rural Development (DARD), Northern Ireland and with Queen's University, Belfast, where she is a Reader in Food Science. She is a Principal Scientific Officer within the Food Microbiology Branch of DARD and, as a project leader, has special responsibility for research on novel food processes. She has eight staff at DARD and two at Queens—three male and seven female and she is also responsible for the microbiology teaching labs. "I have a great team." she enthuses. When asked about her management technique she told us it is based on trust, openness and the knowledge that she can rely on her staff absolutely to get the job done with the minimum of fuss.

When asked about her current position Margaret is enthusiastic: "I've always been fascinated by microbiology—the fact that there are organisms we can't see with the naked eye that are constantly busy working against us to cause disease or for us such as making foods or drugs to fight disease. I see the object of my research as keeping them under control and making them work for us. I am also lucky enough to study in an institution with both government and academic facilities, which is an excellent research and training environment for students."

When asked about the education system, she said: "Nowadays the system is modular. In my day there was an integrated approach to teaching which in my opinion is better. Our courses had a heavy practical content. However, this method of teaching costs. I am fully in support of the campaign to increase the amount of practical teaching. There is a shortage of food scientists and indeed microbiologists in the UK with the right skills."

We asked Margaret if she would advise people to choose science as a career.

"I would advise anyone to consider a career in science. Not for the money that's for sure, but there are many reasons why science is such a good choice. I like it because it is not a 9-5 job. There is a huge amount of variety—it's demanding but it also gives you a lot of freedom. Most importantly of all, it's fun. No two days (let alone weeks) are the same. You are constantly finding out new information and it is always a thrill to see your work published in good scientific journals where you know it has been peer reviewed and met the standard.

Margaret and Arthur Gilmour at DARD

More girls should consider a scientific career. I certainly have never experienced any discrimination. One travels through science based on one's achievements and nothing else. I was lucky enough to be invited to attend the Parliamentary and Scientific Committee lunch in London where The Princess Royal encouraged women in particular to choose science as a career. I wrote to her to thank her and to tell her a little about SfAM. I was very pleased to receive a reply from Buckingham Palace saying that the Princess was very interested to hear of the important work we do. Subsequently I been invited to join WISE—Women in Science and Engineering—which aims to promote science to girls."

We then asked her how she felt about being elected as President of SfAM.

"I am very lucky to be President of the Society at this very exciting time. I have the legacy of the previous Presidents to live up to. Did you know that I am the fourth SfAM President from DARD? John Murray, Arthur Gilmour, Peter Silley (who once worked in DARD) and now me. Arthur Gilmour initiated a series of Strategic Away days on the future direction of SfAM, which Peter Silley very

successfully built upon. Peter introduced a range of initiatives such as our involvement with the BSF and initiatives involving the general public. We are a financially well off Society and we have to thank our previous Treasurers, including Peter, for their sound advice over the years. My aims for the society are to consolidate and build upon the work started by Peter Silley. I want to increase our membership and ensure we can give our members as many useful benefits as possible. I'd like to see our corporate

Margaret and her commercial scale high pressure vessel

membership increase even more than it has in recent times. I'd also like to concentrate on meetings—both in terms of their format and the topics we cover. Working alongside our new Chief Executive Officer, Mr Philip Wheat, I'd like to work to improve our public image. We already have plans to improve the website, for example, one of the first points of contact with the general public. I think SfAM is starting to, and will continue to go beyond the traditional role of a learned society. As part of our 75th anniversary celebrations we are introducing **Anniversary Fellowships** (see page 13 for more details). Next year will definitely be a reflective period for SfAM as we are the oldest UK microbiololgy society. We will reflect upon what we've achieved up to now, and what we aim to achieve in the future."

As we've said, Margaret has a very hectic work and social schedule. So, we asked her who has influenced her and who have been her role models?

"I have to thank DARD for giving me permission to get involved in "external affairs" such as SfAM, as this has really helped me develop as a person and as a scientist. Arthur Gilmour, who is my line manager, has been particularly supportive throughout my career, providing sound advice when I need it and allowing me to get involved in many of the national and international initiatives. However, I guess my utmost role model has to be Dr Hilary Stevenson. She was a food chemist here at Newforge and I worked with her as part of a food irradiation research team when I first joined DARD in 1986. Hilary was an excellent scientist and an excellent manager of staff and also one of the kindest people I have ever known. She


BUCKINGHAM PALACE

took me under her wing and became my mentor. She was the one I turned to for advice, especially in my early days as a lecturer with staff management responsibilities for the first time. Sadly she died in 1994 but I will always be grateful for her support and inspiration at the start of my career."

We went on to ask Margaret what her current research interests are.

"My main area of research is looking at novel food processing methods to ensure microbiological safety and quality. We are particularly interested in using high pressures (up to 900 MegaPascals, MPa) as a way of killing microorganisms in foods. To get this pressure into some perspective, the pressure at the deepest parts of the ocean is 120 MPa. Also, 400 MPa is equivalent to the weight of three elephants standing on a strawberry. This technique is over 100 years old, but was 'forgotten' until relatively recently. This form of preservation kills microbes but ensures that food retains its colour, flavour and nutrient value so meets consumer demands for 'natural', high quality, minimally processed products. The aim of our research is to see how microbes respond to pressure, what affects their pressure resistance and to optimise processing conditions for different foods. We are currently working on the pressure treatment of fruit juices, fish and shellfish, dairy products and cooked meats.

We've recently obtained a commercial scale high pressure vessel which complements our existing two small research vessels. This means we have a unique facility within Europe; the ability to develop products on a lab scale and then carry out production scale trials. Increasingly we are involved in confidential contract work with many different food companies and this gives a new dimension to our laboratory-based research work."

We know that you are involved in a number of other science related activities as part of your day-to-day work. Can you tell us about them?

"One role I have is as a Scientific Advisor to *SafeFood*—The Food Safety Promotion Board which is based in Cork. This was established as a result of the 1999 Belfast Agreement (also known as the Good Friday agreement) between the UK and Irish Governments. *Safefood* works closely with the *Food Standards Agency* in the North of Ireland and the *Food Safety Authority* of Ireland and helps to promote collaboration into all aspects of food safety on the island of Ireland. I was initially seconded from DARD for two days per week for six months but am still there in an advisory capacity."

I am also a designated expert on food safety for the *World Health Organisation* (WHO) and the *International Atomic Energy Agency* (IAEA). I spent some time on secondment at the IAEA Headquarters in Vienna, where I learned a lot about how such a big organisation works. I still do some consultancy work for these UN organisations, mainly in the middle and far east—this recently took me to Bangkok, so it is a great way to see the world on expenses!"

Finally, we asked Margaret what she was going to do after our meeting.

"I have to do two staff appraisals this afternoon, which sounds more onerous than it actually is because I have such a great team. But after that I'm going for a pedicure—I like to pamper my feet!"

Margaret Patterson will be writing her first column in the next issue

MED•VET•NET

Teresa Belcher reports on the latest news and initiatives from Med-Vet-Net

MED-VET-NET IS A EUROPEAN Network of Excellence that aims to improve research on the prevention and control of zoonoses by integrating veterinary, medical and food science research. Comprising of 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 5 years.

Approaching its first year

As **Med-Vet-Net** approaches its first year anniversary in September 2005, the project is showing significant progress in meeting its objectives and the visible benefits of the Network are clearly evident. In this first year, a 'Virtual Institute', integrating the 16 European partners, has been created. This is supported by a legal agreement, with governance at Institute Director level, and an Advisory Panel of International Experts. The scientific aspects of network activities are managed by a Project Manager working closely with a Co-ordinating Forum comprising senior representatives from all of the institutes and a Communication Unit. The administrative and financial aspects of the project are managed by the Co-ordinator's Representative supported by an Administration Bureau.

First General Scientific Meeting

Med-Vet-Net held its first general scientific meeting at University College, Winchester, UK from 29 June - 1 July 2005. The three day meeting was attended by 183 delegates from all partner institutes within the network.

The programme was packed with many opportunities to attend oral presentations and appraise posters. There were approximately 70 short scientific presentations made by representatives of all the network partner institutes and 104 poster presentations displayed throughout the meeting. The presentation topic areas included Detection and Control, Epidemiology, Risk Research, Host-microbe Interactions and New, Neglected and Topical Zoonoses.

Two keynote speakers attended from the United States: Prof Nina Marano from CDC, Atlanta and Prof Corrie Brown from the University of Georgia. They both took time out from their busy schedules to present the audience with their incisive and thoughtful overviews of the past and future of zoonoses.

Bringing scientists together

There were a number of objectives set out for the First General Meeting of **Med-Vet-Net**, which would be the outcome of bringing scientists from across the partnership together. These were: *To network and develop a common understanding of* ***Med-Vet-Net*** *activities*

At the beginning of the conference, tight little groups of people arrived from each partner institute, however, these groups were soon broken up by our

Communications Team to search for Treasure Hunt clues in the streets of Winchester. The success of the Treasure Hunt was remarkable. Suddenly the institute groups disappeared and people were actively seeking out like-minded scientists from other partner organisations in both the social and scientific activities. The energy and enthusiasm was infectious and was

Further Information

■ For more information about **Met-Vet-Net**, visit our website at http://www.medvetnet.org/ or contact Teresa Belcher at the SfAM offices in Bedford on: **+44 (0)1234 271020**

reflected in the general noise of excited voices and deep discussions at breaks and mealtimes.

*To present the range of scientific expertise, facilities and skills across **Med-Vet-Net***

An excellent standard of science was presented at both the oral and poster presentations. The diversity of interests, the timeliness of the technologies and the breadth of investigatory skills all served to exemplify the wealth of resources the whole network has to offer to European Zoonoses Research. A Communications Workshop was also held which had sessions on internet database technology and how this can be applied to the needs of the network, an overview of the new **Med-Vet-Net** private website, and a presentation on the importance of scientists communicating with the UK media.

To provide opportunities for the development of collaborations

Throughout the three day meeting, it was encouraging to note small groups of delegates holding informal meeting and discussions. Of course, all the hope is that this discussion will be translated into new collaborative projects in the future. Already one new European discussion group on New and Emerging Zoonoses has been generated, others will hopefully develop in the future.

EU-US Safe Food – building further collaborations

The model and success of Med-Vet-Net has been instrumental in the proposal for a new EU-funded project called EUUS-SAFEFOOD.

EUUS-SAFEFOOD aims to develop a transatlantic strategic alliance, between food-borne zoonoses research networks in the European Union and the United States, in order to develop shared and common research interests on all aspects of microbiological food safety within the total food chain. Particular emphasis will be in the pre-harvest phase of production, with a longer term aim of improving international understanding, enhancing scientific capacity to respond to international food borne incidents, harmonising responses to food safety issues and providing evidence-based advice in support of government policies.

Part of the remit of **Med-Vet-Net's** Workpackage 2 (Strategic Scientific Integration) is the expansion of the network activities to external scientists. EUUS-SAFEFOOD undertakes to in part fulfil this remit by extending its activities to a new European partner (RVI) in one of the new member states, not previously included in Med-Vet-Net, and by enabling scientists from all EU member states, regardless, or not, of involvement with **Med-Vet-Net.**

In the US, the co-operating scientists will primarily be from a new Food Safety and Response Network (FSRRN). FSRRN will work to address major pre-harvest production issues that impact on food safety in the US and will provide a response team able to conduct focussed research aimed at the control of major episodes of food-related illness. The network comprises a multi-institutional and multidisciplinary team of over 50 food safety experts from 18 colleges and universities in the US and Canada, which will investigate several of the most prevalent food-related pathogens. FSRRN is funded by the USDA Cooperative State Research, Education, and Extension Service (CSREES). EUUS-SAFEFOOD has the three following objectives:

■ **Objective 01:** To establish, by means of a programme of 4 joint workshops over 3 years, a common understanding of the state-of-art knowledge of the microbial ecology, epidemiology, detection, and control and intervention of specific food borne pathogens of joint interest to the EC and USA.

■ **Objective 02:** To identify and, where feasible, initiate areas for joint collaboration in research and surveillance, by developing an expert scientist exchange programme involving the funding of travel grants to up to 20 European scientists over 3 years.

■ **Objective 03:** To disseminate the accrued joint knowledge to other scientists and stakeholders by developing

- a public website within 3 months of the start of the project
- ensuring publication of workshop proceedings within three months of each workshop and presenting network achievements at general microbiological society meetings in the US and EU in 2007.

The Society for Applied Microbiology (SfAM) will build on its experience in establishing the **Med-Vet-Net** Communications Unit, and will be an active partner in EUUS-SAFEFOOD, responsible for communications, and the building and maintenance of the website: http://www.euus-safefood.com.

Teresa Belcher
Med-Vet-Net Communications Director

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.

Belgium

Dr J Heyrman; Mr J A H Vandroenne

Canada

Dr V Bohaychuk; Mr G Moore

France

Dr C Faille; Mr G Tauveron

Ireland

Dr L Gordon; Miss E L McGinley

Italy

Mr S Zardetto

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Dr J Cormolli; Mr M Z Durak; Dr M Hardin; Mr J Huck; Dr B S Seal

A Plea from the Archivist

Intensive work on sorting the society archives has shown that they are far from complete. Members, especially long-standing ones, may be keeping material that is of interest in recording the history of the society. Items such as minutes, meetings reports, journals, letters and indeed, anything pertaining to the Society and its predecessors, the *Society for Applied Bacteriology* and the *Society for Agricultural Bacteriology* would be very welcome if members could bear to part with them. I can assure you they will find a good home in the archives!

If you can help then please contact David Post either through the SfAM office, or directly on: **01424 870590.**

David Post

Advertise!

With a highly targeted circulation of 2000 copies, *Microbiologist* is a cost-effective way for members and non-members to reach qualified microbiologists in industry, academia and public services, both in the UK, and worldwide.

For more information about the benefits and costs of advertising your products or services in *Microbiologist* please contact the Society Office or visit the website.

School Associate Membership of SfAM

Why not recommend SfAM membership to your local school?

Benefits

- Quarterly copies of *Microbiologist*
- Full access to the Society website
- Preferential rates at all Society Meetings
- All for only £15.00 per annum!

Deaths of members

We were greatly saddened to learn that Dr J W Hopton of Alvechurch, Birmingham, a retired member of the Society since 1956, passed away in February this year.

Also, Mrs Pamela Smith, a full member since 1991, of Winchester, who passed away aged 55 from breast cancer.

Our condolences go to all their friends and family.

Sponsor a new Member of the Society and win a £50 Book Token!

Could you be the next winner of the 'SfAM Sponsor of the Year' Award?

If you feel you could be our next winner for 2005, 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.

Could YOU benefit?

Did you know that the Society has many generous grants and prizes available to members? To find out if you are eligible and could benefit visit the website at:

www.sfam.org.uk

SfAM Anniversary Fellowships

Are you a member of staff in a private, academic or government laboratory? Want to train in a new technique and add to your CPD points? Know somewhere you can go to get this training but don't have the funds to get there?
Why not apply for the new SfAM Anniversary Fellowship?
SfAM will pay a maximum of £1000 per week for a 1-4 week visit (to include staff travel expenses and laboratory consumables).
Contact the SfAM office for full details and an application form.

General Conditions

1. Applications should be made through completion, and submission, of the SfAM application form. There is no closing date for applications but applicants should apply at least 6 weeks in advance of the proposed start date of the Fellowship.

2. The SfAM Awards Panel will be responsible for making the decision on allocation of awards.

3. Normally, recipients of the awards, or their employer, will be members of SfAM.

4. Recipients of the awards are expected to provide a report on their Fellowship e.g. through an article in Microbiologist or by an oral or poster presentation at a SfAM conference.

5. SfAM is not responsible for any injury or ill effect suffered by the applicant during the course of the visit. It is the applicants responsibility to ensure that he/she is covered under the relevant personal indemnity insurance policies of the host laboratory.

6. Normally, recipients of the awards are not postgraduate students, but in exceptional circumstances such applications may be considered.

contact: 01234 326661

Farewell to Peter Silley

ON SUNDAY 3rd JULY 2005, the SfAM committee gathered at a famous Brighton restaurant for a lively get together. Everyone was happy to catch up with each other as it had been several months since some members had seen each other and they were all full of the latest developments in their labs, careers and even personal lives. However, despite a lovely meal and a lot of joviality, one couldn't help but sense a hint of melancholy in the air. The reason for this was the fact that this meal had been arranged for a particular purpose—to say a big 'Thank you' and 'Au revoir' to our Honorary President, Dr Peter Silley.

As you'll all know, Peter has made a lot of changes during his tenure as President of the Society and Anthony Hilton—our Honorary General Secretary has been on the committee for the entirety of Peter's reign. Anthony told us: "When I reflect over the past three years and look at where the society has gone and some of the things that we've done we somewhat take it for granted that what we've achieved with the **Med-Vet-Net** partnership, *Microbiologist* magazine, the new staff we now have in the office with Phil and with Marisa, it all seems such a flash in the pan really. Whilst I'm not suggesting that it's all the work of one person, I certainly believe that Peter has kept the focus of the committee and kept us all driving towards a common aim. For that I respect him and I want to give him thanks. I think of the society as somewhat like the Hotel California really, in the you can check out any time you like but you can never leave! I'm pleased that Peter isn't leaving us entirely that he is taking on a new role as Custodian Trustee. I know that myself and Margaret hope to consult with him and take advice from him in the future. I believe that Peter has been a very strong leader for us over the past three years and I hope that he will still advise us as we move into the future."

A couple of amusing stories about Peter ensued. We won't go into all the details now, but if you were ever to ask him about Nigels' fishing story and his yellow submarine, I'm sure a smile would creep across his face! We were also entertained by an amusing tale from Margaret Patterson of his earlier years in the civil service and his involvement in a training course on presentation skills

Committee pay tribute to **Dr Peter Silley**—the Society's outgoing Honorary President

"Some of you may not know this," Margaret began, "but Peter worked as a Civil Servant within the Science service of the Department of Agriculture in Northern Ireland and also had a joint appointment at Queen's University, Belfast, in the 1980s. I was only a young PhD student at the time in the same lab. I didn't get to know him very well as he was the (much) older, wiser member of staff with gravitas coming out of every pore. I do remember even in those days that he was keen on fishing and rugby. However Peter only stayed a few years in the Department—looking back on it, it was obvious that he was not cut out to be a civil servant. He was too clever by half and was always looking at ways to beat the system. Here is a true story from that time. All good civil servants are sent on courses on anything from how to answer a telephone in the approved official manner to rapid reading. One such course was *'how to give a presentation.'*

This involved a practical session where everyone was videoed giving a presentation and then the tape was played back and the individual was given 'constructive feedback', mostly from folk who have never had to give a real life lecture! Anyhow, Peter has always been ahead of his time and he produced computer generated acetate overheads of his talk—everyone else just turned up with nothing or used the 'chalk and talk' method on the blackboard. Eventually an overhead projector was found in a cupboard and dusted down. Peter gave his presentation as required—but before starting, put out all the lights. Much to the dismay of the course tutors the resulting video was completely black and they couldn't give Peter any feedback on any of his mannerisms. He was obviously destined for greater things!

Actually, in a way that has worked out very well for me because when he left to enter the real world of industry, his post became vacant and I applied and was successful in being appointed. So for that Peter, I owe you a big thank you!

On a more serious note, when I was first told I'd been nominated to become president, I went through mixture of emotions. Then was the awful realisation that I would have to stand up and give a speech at the summer conference meal. Most of you that know me, know I don't do speeches. Unlike Peter who is imfamous for his jokes. Thank goodness we didn't buy Peter a jokebook as his commemorative present.

But once I'd calmed down a bit I thought: 'Gosh if you're ever going to be president of SfAM, now's the time to do it because its such an exciting time in our history.' The reason for this is due to the vision and foresight of previous presidents. Peter came forward as president in 2002 and the last three years have been a bit like a roller coaster ride really. The thing that's really come forward are the number of initiatives which are now coming to fruition and that's why I'm lucky to be president at this time. For me, one of the biggest assets is the appointment of Sekona partnerships—Professor Nigel Poole and Professor Geraldine Scholfield. With their help I think we have become a very credible voice in the world of movers and shakers where the decisions are being made. Peter's very active in this respect—he's a regular diner in Westminster!

Another thing we've been very much involved in is the science media centre (SMC), an organisation which helps journalists and the press who want to know more scientific information. We reported on the SMC in our feature article

in the March 2005 issue of *Microbiologist*. A number of our members have been called upon to talk to the press and media on topical microbiological issues and Dr Anthony Hilton is a huge star of TV! So we are getting our message out there and promoting the positive image of microbiology. I can't help but mention **Med-Vet-Net**, something that we're all very proud of. **Med-Vet-Net** is an EU-funded medical veterinary programme bringing together ten countries and 300 scientists. SfAM is one of the overarching Workpackages and Peter once again is very much involved in that as Workpackage leader. You can read more about Med-Vet-Net on page 10.

Something that has been tremendously successful over the last few years is the our in-house magazine. I'm sure you all agree that *Microbiologist* has come on in leaps and bounds. It's read right around the world and things like the design-a-bug competition that we ran last year brought the whole concept of microbiology into primary schools and that's got to be good for the future of microbiology.

All these things contribute towards our charitable aim to put back into the community. Most, if not all these initiatives have been spear-headed by Peter in the last three years. We have an excellent team in the office now and the appointment of our new CEO, Mr Phil Wheat, has come as a welcome addition to the Society office. He is working so well to manage all these initiatives and all the administration that comes with them.

This means the presidents job is going to be so much easier than it was for Peter when he was coming in. We are also in a fortunate situation financially and that is due to the hard work of the previous treasurers, that includes Peter as well. We have seen large benefits over the years but also, most importantly we have excellent and widely-read journals. We have the *Journal of Applied Microbiology* and the *Letters in Applied Microbiology* and also we're involved in a joint venture—*Environmental Microbiology*. These journals are going from strength to strength. The impact factors were announced recently and we are delighted that all three journals impact factors have increased. That doesn't happen by chance, it's due to the hard work of the editors and editorial board. I'd also like to thank the officers and committee. It's great to have the ideas for these initiatives but without the willingness of committee, of someone to volunteer their time to put them into action, these ideas would amount to nothing. One key driver in all of this has been Peter. Peter and I have known each other for a long time. He's been a friend and I want to thank him for all the help and support he's given me over the years.

There's one down-side to being president at the moment and that is the fact that Peter's is such a hard act to follow. We can never thank him enough for the amount of time and effort he's dedicated to the society throughout his time on committee, as treasurer, and as the past president."

Finally, Peter Silley added: "It didn't actually hit me until I came down in the lift this evening that this would be the end. It's been amazing really and I think what's particularly exciting is what's also quite disappointing—leaving committee after far too long. I've been on committee about 14 years making me the longest serving member of anybody here. When I first came onto committee there was an initiative by a previous president at that time which was called 'new blood'. It was the time when they were creating some of these new blood lectureships—trying to get young people into academia, so they were trying to get some young people onto the SfAM committee, but in fact the whole new blood initiative was turned down.

The first time I stood for committee I wasn't elected. It is pretty disappointing if your name goes forward in a ballot and you don't actually make it. So I thought, right, I'm not going to stand for that committee; if they don't want me then that's fair enough. Within about twelve months I was co-opted onto committee and that was about 14 years ago. I've really enjoyed the last three years. There have been some difficult times and difficult decisions to be made, but its great to work with a committee that are so committed to the society. I look round and I can say that everybody's doing something for the society and I think that's what's important. As I said, when I was coming down in the lift and started thinking about it all I won't deny that I wasn't fighting back a tear. I will miss it, but one one thing I know is that in Margaret you have a worthy president.

I think some of the things that we've been able to do in the last few years and some of the initiatives we've made on a political level are really exciting. The past president was completely opposed to joining in with any other society. He passionately believed in SfAM as an entity in itself. I believe we have a distintiveness which is unique. We are the Society for Applied Microbiology—the voice of applied microbiology. We represent applied microbiololgy and need to work at that. We've done some amazing things, we're involved in **Med-Vet-Net**, and that's been incredibly exciting and stimulating with real opportunities to get involved in microbiology on the European stage. Every one of us has a part to play and I look forward to seeing the society grow from strength to strength. Our success is due to the success of our journals. It's the journals that underpin everything we do. So we need to give all the support we can to the editors because they are our lifeblood. It's been absolutely great to work with you all and I really do wish you and the society all the best."

2005 SfAM AGM

The 74th annual general meeting of the Society for Applied Microbiology was held on Wednesday 6 July at 6.00 pm in the Old Ship Hotel Brighton. The Honorary President, Dr Peter Silley, was in the chair and 33 members were present.

Present

Martin Adams; Lucy Harper; Grahame Gould; Don Whitley; Rachel Compton; Jean-Yves Mallard; Margaret Patterson; Frances Presland; Fred Skinner; Sarah Jackson; Jane Sutherland; Joan Norris; Keith Jones; Stuart Petitt; John Rigarlsford; Karen Stanley; David McCleery; Susannah Welsh; Andrew McBain; Shona Nelson; Peter Gilbert; Rosalind McHugh; Anne Moir; Julie Eastgate; Hilary Dodson; Tony Worthington; Geoff Hanlon; Paul Gibbs; Barrie Seddon; Arthur Gilmour; Uyi Uwagboe; Christopher Ibenegbu; Colin Harwood; Anthony Hilton.

1. Apologies for absence

Apologies of absence were received from Barbara Lund; David Post; Ron Board; Murial Rhodes-Roberts; Alan Godfree; Valerie Edwards-Jones.

2. 73rd Annual Meeting

The minutes of the 73rd AGM held at Jury's Hotel, Cork were circulated to those present. The minutes were accepted as a true and accurate record of the meeting, proposed by Colin Harwood and seconded by John Rigarlsford.

3. Matters arising

There were no matters arising.

4. Report of the Trustees

of the Society for the year 2004. *Copies of the report for the year 2004 were previously distributed to all members attending the meeting.*

(i) Report of the Honorary President:

Dr Silley commented that the impact factors for the *Journal of Applied Microbiology* and *Letters in Applied Microbiology* were again increased from the previous year. Dr Silley then went on to thank all the Editors and the Editorial Board for all their hard work. Dr Silley also highlighted that recent impact factors for *Environmental Microbiology* and indicated that had surpassed that of *Applied* and *Environmental Microbiology*.

(ii) Report of the Honorary General Secretary:

Dr Anthony Hilton highlighted that subsequent to producing the 2004 Annual Report a few errata had been noticed. An attachment will be made of these when forwarding the report to the financial auditors and onward to the Charity Commission.

Dr Silley then asked the members whether they had any comments to make regarding the 2004 Annual Report presented to them. There were no comments made.

5. Adoption of the Annual Report 2004

Dr Silley asked for the report to be officially adopted by those present. Dr David McCleery proposed and Dr Stuart Pettit seconded the proposal.

6. Election of Honorary President

Dr Silley put forward Dr Margaret Patterson as the new President. He asked if there were any other nominations from the floor. No other nominations were forthcoming. Dr Silley proposed and Don Whitley seconded. The proposal was unanimously accepted. Dr Silley then presented the presidential chain of office to Dr Patterson.
The rest of the meeting was then chaired by Dr Patterson.

7. Election of Custodian Trustees

Dr Patterson proposed that the following should be recommended for positions of Custodial Trustees of the Society:
Professor Basil Jarvis
Professor Grahame Gould
Dr Peter Silley

The Committee proposed and this was seconded by Professor Colin Harwood.

8. Election of two new committee members

Dr Anthony Hilton reported that this year there were two committee vacancies as Dr Ian Feavers and Dr Julie Eastgate were retiring by rotation. Dr Hilton thanked these two people for there contributions and hard work during there terms in office. Dr Hilton then stated as replacements he wished to propose Dr Tony Worthington this was seconded by Dr Susannah Walsh. In addition, Dr Andrew Sails was proposed by Dr Peter Silley and was seconded by Dr Keith Jones. Both these names were unanimously accepted.

9. Election of Honorary Chief Editor -

Journal of Applied Microbiology. Mr Alan Godfree was retiring due to rotation as the Honorary Chief Editor of the *Journal of Applied Microbiology*. Dr Margaret Patterson thanked him for all his hard work and efforts during his term of office. She then reiterated the importance of the well being of the journals for the effective running of Society business. Professor Arthur Gilmour was proposed by the Committee and was seconded by Mr Don Whitley.

10. Election of new members

A list of names of applicants for membership was tabled and all were accepted.

11. Deaths and resignations

A list of names of members who had died or resigned was tabled and all were accepted.

12. Any other business

John Rigarlsford sought clarification of the situation concerning whether value added tax was charged for Society meetings. Dr Silley replied that this was being looked into and committee would report back once advice had been received.
Fred Skinner thanked the officers, committee members and the office staff for all their hard work and efforts in running the business of the Society. Margaret Patterson replied that she was most grateful for such a comment.

13. Date of next meeting

The next ordinary AGM will be on 5th July 2006 in Edinburgh at 18.00 hrs in the Apex International Hotel.

MISAC Competition 2005

Each year the Microbiology in Schools Advisory Committee (**MISAC**) runs a competition as part of its activities to promote the study of microbiology in schools. SfAM is a longstanding supporter of **MISAC** and has sponsored these competitions in the past. This year however it was the turn of the British Mycological Society (BMS) to sponsor the 17th competition. Naturally enough they took the opportunity to encourage students to focus on the fungi and set them the task of producing a poster to inform the public of the importance of fungi in the production of foods, drinks and other goods that they buy.

First Prize 11-14 Age Group: Torben Kallmeier

Fungi in your shopping basket

WINNING ENTRIES

11-14 AGE GROUP

First Prize

Torben Kallmeier, Royal Grammar School, High Wycombe

Second Prize

Douglas Yeong, The Grange School, Northwich

Third Prize

Annabel James, St George's School, Ascot

Highly Commended

Oliver Browne, Royal Grammar School, High Wycombe

Commended for Design

Hannah Murray and **Samantha Wynn**, Wakefield Girls' High School, Wakefield

GCSE AGE GROUP

First Prize

Emily Oldroyd, Durham High School, Durham

Second Prize

Sam Shires, Wellington College, Crowthorne, Berkshire

Third Prize

Emma Pascal, Durham High School, Durham

Highly Commended

Cornelius Riethdorf, Wellington College, Crowthorne, Berkshire

Commended

Edward Bartley and **James Huelin**, Wellington College, Crowthorne, Berkshire

Commended for Design

Mahiran Rahmat, Hamilton Community College, Leicester

Yeasts and moulds play crucial roles in decomposition, cause significant losses in agriculture through plant disease and are involved in the production of many traditional and novel food and drink products. In health care, their invaluable role as producers of antibiotics is well known but there is also a worrying increase in fungal diseases of human beings, including those that are sexually transmitted. However, it is unfortunate that despite these profound effects on everyday life, the fungi do not feature strongly in syllabuses in schools and is

First Prize GCSE Age Group: Emily Oldroyd

Second Prize 11-14 Age Group: Douglas Yeong

Second Prize GCSE Age Group: Sam Shires

Third Prize 11-14 Age Group: Annabel James

Third Prize GCSE Age Group: Emma Pascal

even diminishing at university level. Therefore, the success of this year's competition was particularly encouraging.

There was a splendid, response of some 550 entries involving nearly 900 students from 80 schools and colleges throughout the UK. As is usual, there were more entries from the Key Stage three group than from the GCSE years, but a welcome development this year was that eight institutions provided entries in both age groups. In addition to the three prizes awarded in each age group (see box), all the schools who entered the competition received a pack of microbiology teaching resources put together by BMS and **MISAC**.

Officers of BMS, including the writer and broadcaster, Professor Stefan Buczacki, who is a Past President of the society, joined members of **MISAC** for the judging at the Institute of Biology in London. The judges looked for designs that make an immediate impact, address the topic clearly and use an attractive layout to engage the attention of members of the general public long enough for them to learn something about the wide range of products with which fungi are involved.

Many entries impressed the judges with their high quality of presentation, success in achieving their purpose and demonstration of a good grasp of the underlying science. One aspect the judges looked for with respect to originality, was evidence of the use of entrants' own words, not entire text taken directly from sources such as the web. The competition also gave opportunities for drawing and writing by hand and for using ICT skills and both of these approaches featured among the prize winners. Some of the unsuccessful entries failed to follow the old maxim 'read the instructions carefully.' They showed much promise but were eliminated from consideration for prizes as they either did not address the specified topic, e.g., dealt with the importance of fungi in general, or did not comply with the specified A3 format. Also some entries showed much imagination and industry in incorporating features that unfortunately do not lend themselves to a poster format, e.g. the use of sliding panels of information, three-dimensional effects and various 'dangly bits.'

Careful checking of spelling would also have helped a few entrants, for example, avoidance of the term '..fungi is..'

Martin Adams

Further Information

- **MISAC) website: www.microbiologyonline.org.uk/misac**

a one day meeting on

Epidemiology and vaccines

The Royal Society, Carlton House Terrace, London
Thursday 5th January 2006

CPD ACCREDITATION
applied for

Call for Posters!

There will be an opportunity during the meeting to present posters in any relevant subject area. Abstracts of less than 500 words, to include aims and objectives, brief methodology, results, conclusions and implications of the work, should be submitted only as a Microsoft™ Word document attachement to an email addressed to info@sfam.org.uk with the subject line 'January 2006 meeting submission'.

For the latest information, please visit us online at:
www.sfam.org.uk

- Including: **The Denver Russell Memorial Lecture**

Parallel Sessions on:

- Vaccines
- "From postcodes to pandemics – global infectious disease epidemiology on your doorstep"

January Meeting 2006

Programme

10.00-10.30 Arrival/ Coffee/ Registration

10.30-11.15 The Denver Russell Memorial Lecture: Biocides, efficacy testing, epidemiology?
Prof. A. Sattar, University of Ottawa, Canada.

11.15-11.45 Avian Flu.
Prof. J Roberston, NIBSC, UK.

11.45-12.15 How epidemiology informs vaccine design.
Prof. Martin Maiden, University of Oxford, UK.

12.15-13.15 Lunch

Afternoon: two parallel sessions of five talks (thirty minutes each)

Session A: Postcodes to pandemics: new perspectives in global disease epidemiology.

13.15-13.45 Geodemographics – spatial analysis of your neighbourhood.
Prof. Richard Webber, University College London, UK.

13.45-14.15 Epidemiology of TB between Asian and UK communities.
Prof. Peter Hawkey, HPA Birmingham, UK.

14.15-14.35 Tea

14.35–15.05 Epidemiology of foodborne pathogens in the Grampian Region
Dr. Norval Strachan, University of Aberdeen, Scotland.

15.05-15.35 Spatial statistics of infectious disease.
Prof. Peter Diggle, Lancaster University, UK.

15.35-16.05 Impact of global climate change on infectious disease epidemiology.
Prof. Paul Hunter, University of East Anglia, UK.

16.10 Meeting closes

Session B: Current Vaccine Issues

13.15-13.45 Conjugate vaccines in the infant immunization programme.
Dr. Andrew Pollard, Dept of Paediatrics, University of Oxford, UK.

13.45-14.15 MMR
Dr. Mary Ramsay, CDSC, HPA Colindale, London, UK.

14.15-14.35 Tea

14.35-15.05 Bioterrorism Vaccines.
Prof. Richard Titball DSTL, Porton Down, UK.

15.05-15.35 Vaccination against MRSA.
Dr. Ali Fattom, Nabi Biopharmaceuticals, England.

15.35-16.05 Latest developments in TB vaccines.
Dr. Doug Lowrie, NIMR, Mill Hill, UK.

16.10 Meeting closes

Please note that the above paper titles and speakers were correct at the time of going to press but may be subject to change.

CPD ACCREDITATION
applied for

Book online!

Members and Non-members who wish to book their place at this meeting can now book online via the website using our secure online booking form, or by printing out and completing our PDF booking form. To book and pay online simply point your browser at:
www.sfam.org.uk/janmeet.html

For the latest information, please visit us online at:
www.sfam.org.uk

BOOKING FORM and INVOICE

SFAM JANUARY MEETING 2006 THURSDAY 5th JANUARY 2006

a one day meeting on Epidemiology and vaccines

Only ONE person per form please. If additional forms are required please photocopy this one. CLOSING DATE FOR REGISTRATIONS: Thursday 1st December 2005. A LATE BOOKING FEE of £20.00 will be applied to all bookings made after this date.

FEES

Whole Conference Rate: inclusive of registration fee, coffee breaks and lunches.	Full Members	Student, Honorary, Associate & Retired Members	Student Non - Members	Non - Members
	£50.00	£30.00	£60.00	£95.00

YOUR INTERESTS

Below is a list of some of the meeting topics. Please indicate which topic you would like to attend by ticking the appropriate box(es). Places will be reserved on a first-come first-served basis, but we will try to accommodate your preference

- ☐ **Session A:** Geodemographics – spatial analysis of your neighbourhood.
- ☐ **Session A:** Epidemiology of TB between Asian and UK communities.
- ☐ **Session A:** Epidemiology of foodborne pathogens in the Grampian Region.
- ☐ **Session A:** Spatial statistics of infectious disease.
- ☐ **Session A:** Impact of global climate change on infectious disease epidemiology.
- ☐ **Session B:** Conjugate vaccines in the infant immunization programme.
- ☐ **Session B:** MMR
- ☐ **Session B:** Bioterrorism Vaccines.
- ☐ **Session B:** The Challenges in Developing a Vaccine for Immunocompromised Patients: 'The StaphVAX Story.'
- ☐ **Session B:** Latest developments in TB vaccines.

YOUR COSTS

Charges - please tick the applicable box(es)	Amount
☐ **Whole Conference Rate:**	£
☐ **LATE BOOKING FEE** Payable for all bookings made after Thursday 1st December 2005	£20.00
TOTAL AMOUNT REMITTED:	£

YOUR DETAILS

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

Address:_____

_____ **Postcode:**_____

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

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

YOUR PAYMENT

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

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

TOTAL Amount enclosed/ to be debited: (*Remember to include your LATE BOOKING FEE if booking after 1st December 2005) **£** _____

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

Signature: _____ *Date: _____ Cardholder's address to which credit card statement is sent:

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Please return the completed form by fax (post if you are enclosing a cheque) to:
The Society for Applied Microbiology, The Blore Tower, The Harpur Centre, Bedford MK40 1TQ, UK.
Tel: 01234 326661. Fax: 01234 326678. Email: meetings@sfam.org.uk

SUGGESTION: please photocopy this form to save mutilating your copy of the Microbiologist!

STUDENTSHIP Application

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

SFAM JANUARY MEETING 2006 Thursday 5th January 2006

☐ **I wish to apply for a SfAM Studentship grant to attend the 2006 SfAM January Meeting**

About this award

The Society 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 Office **no later than 6 weeks before the date of the meeting you wish to attend.**

Your details

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

Address:_____

_____ **Postcode:**_____

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 to the meeting 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,**
The Blore Tower, The Harpur Centre, Bedford MK40 1TQ, UK. Tel: 01234 326661. Fax: 01234 326678. Email: meetings@sfam.org.uk

SUGGESTION: please photocopy this form to save mutilating your copy of the Microbiologist!

Health Protection Agency Annual Conference 2005

12 -14 September 2005
Warwick University, UK

The conference will bring together over 900 health protection professionals from a variety of disciplines to meet, learn and share knowledge and expertise. The main themes — Health Inequalities and Patient and Public Safety — will be analysed and discussed by experts from the HPA and our national and international partner organisations. Alongside this, a full programme of parallel sessions and poster exhibition will showcase new research and developments in health protection, providing an opportunity to gain knowledge and insight into work on a wide range of health protection issues. Please check the conference website for updates on the programme.

The online registration system is now open — please book early to guarantee your place. We hope you will be able to join us in September.

CALL FOR ABSTRACTS

A reminder that abstracts are now invited for oral and poster presentation at the Health Protection Agency Annual Conference 2005, taking place on 12-14 September at Warwick University.

Please visit the website for further details of the online submission system - **http://www.hpaconference.org.uk**

ONLINE REGISTRATION

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Email: hpaconference@hpa.org.uk

To register visit: http://www.hpaconference.org.uk

Mastering anti-infective therapies

20th -21st October 2005, Paris, France

Further information:
http://www.pasteur.fr/applications/euroconf/antiinfectionstherapies/index.html

The Institut Pasteur is sponsoring a series of conferences on important topics in biology and medicine, primarily intended for scientists working in the pharmaceutical industry, public health laboratories and agencies, and hospitals.
These comprehensive conferences are delivered by recognised scientists in selected areas. They will allow a true exchange of ideas between basic and applied scientists from the Institut Pasteur and from other academic institutions and those from pharmaceutical companies.

Email: euroconf@pasteur.fr

VENUE: Centre d'Information Scientifique, Institut Pasteur, 28, rue du Docteur Roux, 75015 Paris, France.
BOOKING: Because the number of participants will be limited, we recommend early registration. A special academic fee is available for participants from academic and research staff currently working in University Departments, Government Research Institutes and Hospitals.

BioTechnology Convention 2005

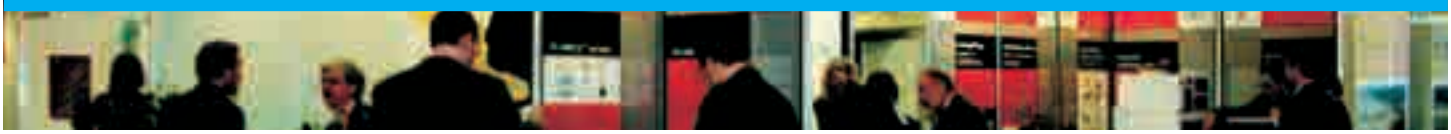
EXCel, London 11th- 13th October

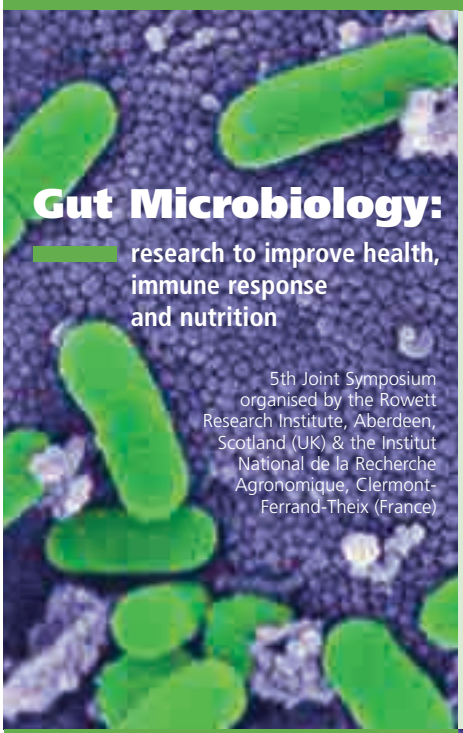
www.cordiaconvention.com

The Programme features: 41 individual topics presented by over 140 industry-leading specialists across white, green and red biotech; 6 key topics and 12 sessions dedicated to emerging markets. In addition to this CORDIA features Masterclass Workshops in: Intellectual Property Law, Licensing and Capital Sourcing - these advanced sessions are designed to allow interaction between delegates and industry experts. Numbers for these workshops are strictly limited and advance booking is mandatory. Sign up for Conference Updates and keep up to date with latest developments.

The main body of the conference consists of six key topics - Cancer, Green Biotechnology, White biotechnology, Vaccines, Neurodegenerative disease and Autoimmune disease. Each of these key topics has a session dedicated to the policy, science and finance that drives the industry. In addition to these topics there are sessions dedicated to 'Emerging Opportunities' - stand alone topics that are of critical importance to the development of European Biotechnology.

ExCeL is a modern state-of-the-art exhibition and conference centre located on the north side of Royal Victoria Dock and in the heart of London's thriving Docklands.





Gut Microbiology:

research to improve health, immune response and nutrition

5th Joint Symposium organised by the Rowett Research Institute, Aberdeen, Scotland (UK) & the Institut National de la Recherche Agronomique, Clermont-Ferrand-Theix (France)

Scientific programme

The overall aim of the conference is to promote understanding of the complex microbial ecosystems that are present in the digestive tract of man and animals, and their interactions with the host.

It is therefore of interest to those working to improve human and animal health and nutrition through dietary manipulation, and to any scientist concerned with the microbial ecology of the digestive tract and the interplay between micro-organisms and their hosts.

Abstracts

Abstract submission and symposium proceedings. All abstracts are to be submitted electronically via the website.

Deadlines

Abstract submission: 31 January 2006
Final registration: 31 March 2006.

Registration

Those interested in attending the conference are requested to pre-register on the RRI-INRA2006 website.

Information

Mrs V. Smith
RRI–INRA Secretariat, Rowett Research Institute, Greenburn Road, Aberdeen AB21 9SB, UK.

Aberdeen 21 - 23 June 2006

Conference website: www.rowett.ac.uk/RRI-INRA2006

illustration: Robert A Thom (1915 - 1980). © Parke Davis & Company

Childbed Fever

Milton Wainwright discusses how a Yorkshire doctor beat Semmelweis to the true cause of childbed fever

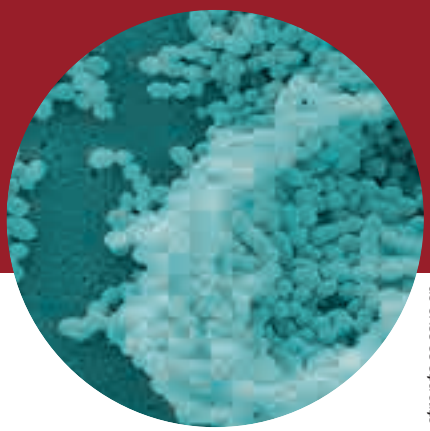
OUR HISTORY teachers tell us that Ignaz Semmelweis (sometimes spelt Semmelweiss or Semelweiss) was the first to recognise the importance of hand washing to prevent cross-contamination of patients, and that it was he who discovered the cause of puerperal or childbed fever, a disease that before the antibiotic age caused countless deaths of women during child birth.

The compelling story of how Semmelweis came to discover that doctors often spread childbed fever is well known; however, it has long been recognised that most of Semmelweis's ideas were predated by the Manchester-based surgeon, Charles White, and later by the American physician and writer, Oliver Wendell Holmes (Wainwright, 2001). Here, the previously overlooked story will be told of how a country doctor, called Robert Storrs, realised how puerperal fever is spread, some years before Semmelweis even began his studies.

Little is known about Robert Storrs other than he lived in the small Yorkshire village of Sprotbrough, and practised in the nearby market town of Doncaster. In the early 1840s, when Storrs did his pioneering work, Doncaster was a quiet market town that had yet to enjoy the boom times brought by the arrival of the railways. From parish records we discover that Storrs was born in Sprotbrough in 1801 and died there in 1847.

He was by no means, however, a lowly village doctor, but was instead Honorary Surgeon to the Doncaster Dispensary and

> I believe it may also readily be propagated from one individual to another, so that if a person be unfortunate to attend a case of the kind, without great precaution, he may be liable to transmit it to others



streptococcus.sp

Medical Officer to the towns Poor Law Union (i.e. workhouse) and in 1824; he was made a Fellow of the Royal college of Surgeons. In medical terms however, the Doncaster that Storrs knew was well off the beaten track and far from the medical power bases of London and Edinburgh, a fact that doubtless explains why he is unknown and why his work had less of an impact than it deserved. By the early 1840s, despite White's work, the cause of childbed fever remained a mystery to the medical profession; a situation that in April of 1842, Storrs was about to change. On the twenty-third of that month his findings were first published in the *Provincial State Medical Journal* (the forerunner of the *British Medical Journal*). The article was then published in the *American Journal of Medical Sciences* in the following year (Anon, 1843). In his report, Storrs gives numerous accounts of his tribulations with childbed fever. For example, he states that on January the seventh, 1841 he attended a Mrs Downes, a washerwoman who was in labour with her tenth child. On the morning of the ninth, thirty-six hours after the delivery of a child she developed rigours with severe abdominal pain, finally succumbing to the disease on the morning on the twelfth. Storrs then goes on to describe another eight cases of the fever, most of which proved fatal.

By the time that a certain Mrs Williams died on February the twenty fourth, Storrs began to realise something that must have proved heart braking. It dawned on him

that he, the doctor—the man who should be saving the lives of the women in his charge - was in fact spreading the disease!

When he next attended to a further sixteen cases, he took the precaution of changing all his clothes and applied "every means I could think of to prevent its' (the fever) spread, including *"thorough ablutions"* (i.e. hand washing). These measures helped reduce, but not eliminate, the disease. From these observations, Storrs concluded that childbed fever must be epidemic in nature and was being spread, not only by himself, but also by other doctors in the neighbourhood. To avoid his unwitting role in the epidemic, Storrs next decided to leave home and visit his friends on the borders of Wales. He now believed that the poison somehow "clung to him personally" and in Wales he hoped that the disease would literally be blown off him. On his return, he found that the number of deaths had declined, but still some women were tragically succumbing to childbed fever.

At this juncture, Storrs happened to meet two practitioners from nearby Sheffield, Dr Thompson and Mr Reedall, who it seems had arrived at the same conclusion; childbed fever was infectious and spread by doctors and midwives. A doctor in nearby Manchester, called John Roberton also came to the same conclusion around this time, while R.Yates Ackerley, a member of the so-called 'English Contagionists', had even earlier linked childbed fever and erysipelas (Ackerly, 1838), a view also advocated by the Thomas Nunneley a notable physician from Leeds, famous for his experiments with anaesthetics; Storrs however, went further by stressing the need for thorough ablution and general hygiene. Clearly, by the 1840s a group of doctors in the Doncaster, Sheffield and Leeds area had come to the conclusion that erysipelas and puerperal fever were one and the same disease.

Post mortem examination: 1845

Storrs soon came to an amazing and worrying realisation. He recognised that before attending the women in his original cases, he had been called to a man suffering from erysipelas where he had handled a number of the patient's weeping abscesses. Realizing that these were the source of the infection, he immediately stopped attending his women patients, leaving them instead with another doctor. On resuming his visits he again changed his clothes between patients and again made '"every possible ablution." Such however, was the scale of the epidemic, that Storrs had to continue treating woman despite in his own words having caused "such a great amount of misery."

From his studies, Storrs realised that childbed fever is generally, but not always, associated with erysipelas. He concluded by stating that:

"I believe it (childbed fever) may also readily be propagated from one individual to another, so that if a person be unfortunate to attend a case of the kind, without great precaution, he may be liable to transmit it to others" and that "In many cases there is good reason to believe that it arises from attendance at post mortems, especially where there has been peritoneal inflammation."

As to cure, Storrs was very pessimistic; noting that everything he tried had little effect on the outcome; when a woman was infected then the likely outcome was death. He found bloodletting to be of no use, although at one time, he was encouraged to believe that calomel might be a useful treatment; but to no avail.

Can we place Storr's Work in context? Firstly why is his work groundbreaking? Well, his paper is dated 1842, that is before either Semmelweis or Oliver Wendell Holmes reported on childbed fever. While Holmes was clearly aware of Storr's work, Semmelweis probably knew nothing of it when he published his own studies in 1846.

The importance of Storrs work can be summarised as follows: Firstly, he recognised that doctors passed on puerperal fever and that its spread could be prevented by removing all soiled clothing and by thorough hand washing. Secondly, he recognised that the disease was carried to mothers to be by doctors who had previously attended autopsies and had failed to wash their hands or changed their clothing. In fact, Storrs recognised everything that Semmelweis is usually credited with having discovered! To his credit, Semmelweis did back up his observations with statistical evidence in 'lying-in' hospitals (data that was unavailable to Storrs), even though many of his obtained similar statistics to come to the opposite conclusion.

There is however, a particularly important way in which Storrs work excelled over that of Semmelweis. The Hungarian doctor believed that the childbed fever was actually spread by the dead flesh (the so-called cadarveric principle) carried from autopsies to the pregnant woman. Storrs however, recognised that the disease was epidemic in nature and was generally, but not exclusively, associated with erysipelas. This disease is caused by the bacterium *Streptococcus* the same bacterium that we now know causes childbed fever. As a result, Storrs confirmed the important etiological connection between these two diseases, a connection that Semmelweis missed.

By 1865 the notably English obstetrician Robert Barnes confidently asserted that puerperal fever was associated with scarlet fever and erysipelas. He also criticised Semmelweis for believing that "puerperal fever, without exception, is a form of absorption—that is it arises from the generation of decomposed organic matter." Many of Semmelweis's contemporaries also noted that they could attend women after doing autopsies without causing ill effects. The Russian obstetrician Hugenberger noted that cadarveric fever is the rarest cause of childbed fever and that an epidemic ranged through Prague in 1849 even though all staff were forbidden to touch dead bodies. Even chlorine hand-washing he claimed, often failed to measurably alter the outcome of epidemic childbed fever (Barnes, 1865).

How can these observations be explained? Well, the situation regarding the spread of puerperal fever is obviously more complex than is generally portrayed. Puerperal fever is caused by *Streptococcus* that can be carried on hands; hand washing does therefore reduce the incidence of the disease. However, childbed fever is also spread from the mouth, particularly during epidemics (that is why face masks were later used by doctors and midwives).

Semmelweis obtained his data outside an epidemic, when the most of the cases would have been infected by unwashed hands, rather than from the throats of infected doctors and nurses, or merely anyone carrying streptococci. As a result, Semmelweis's (by no means novel) suggestion that hand washing would always reduce the incidence of the childbed fever proved incorrect. Storrs in contrast, realised that the disease was not only spread by the unwashed hands of doctors, but also that puerperal fever was related to other epidemic diseases, notably erysipelas and scarlet fever (diseases both also caused by streptococci) (Anon, 1846).

In 1845, Storrs showed that husbands, children and doctors, in fact anyone in attendance, could acquire a generalised fever or erysipelas from childbed fever victims, proving that the diseases were one and the same (Storrs, 1845; Anon,1846). In the following year, the Edinburgh-based physician, Alexander Peddie suggested that childbed fever was caused by a *"virus of animal nature"* that originates from erysipelas inflammation (Peddie, 1846).

Despite the fact that Storr's work was highlighted in the major medical journals, both here and in the States, and was also mentioned by Oliver Wendell Holmes, it seems to have made no impact on medicine of the time; subsequently, even English experts were content to give priority on his findings to Semmelweis. As a result, Storrs died largely unknown and unheralded on the fourteenth of September 1847.

Like Semmelweis and many of the women he tried to help, Storrs died of fever and was buried in the churchyard of his birth, Sprotbrough. Unfortunately no image of him seems to exist, so we are left only with the inscription on his gravestone, which is simple, but very apt:

"the memory of the just is blessed."

Storrs' tombstone in Sprotbrough churchyard

Ignaz Semmelweis

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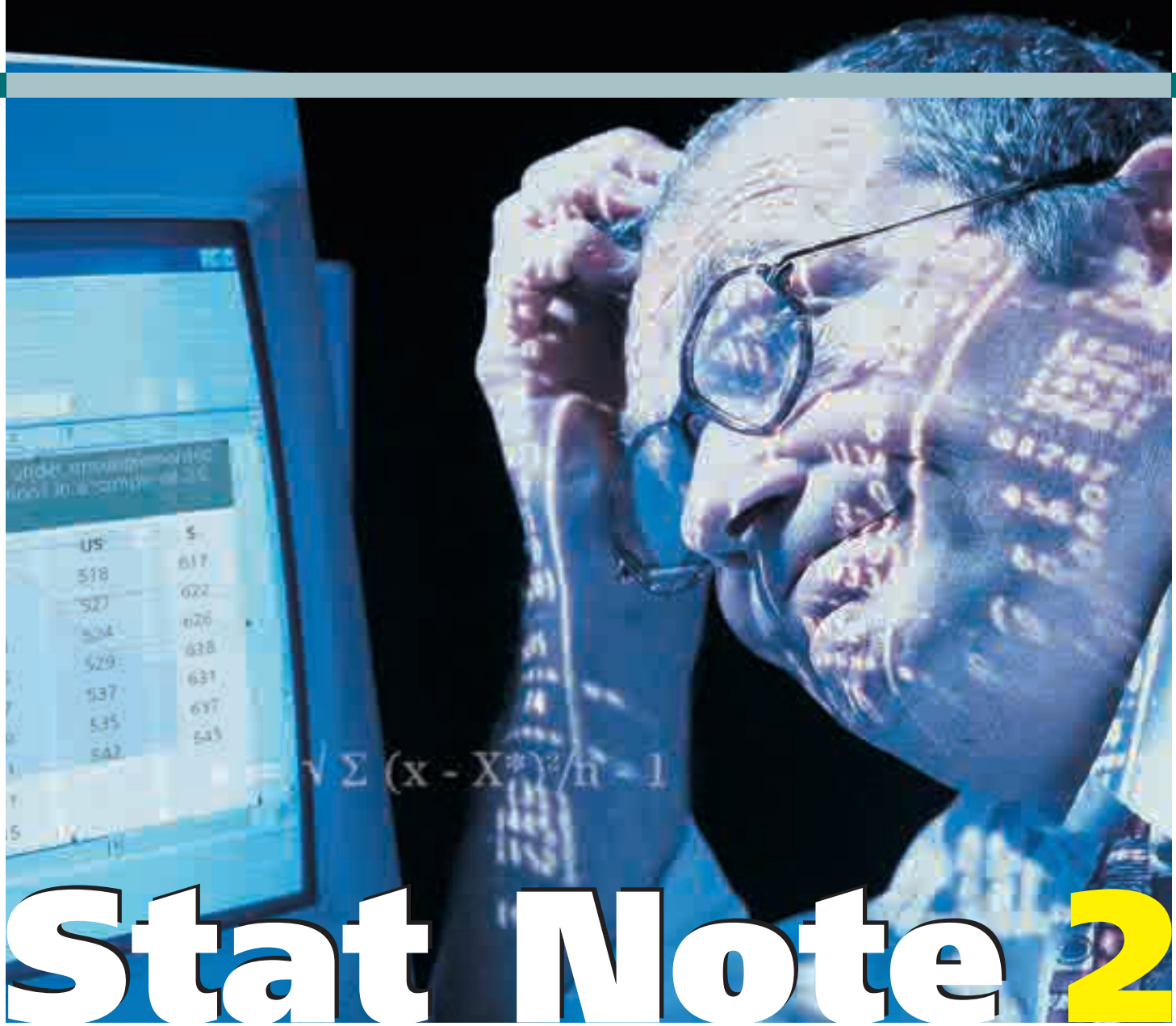
Milton Wainwright



Stat Note 2

In the second of a series of articles about statistics for biologists, **Anthony Hilton** and **Richard Armstrong** describe the application of normal distribution to some common statistical problems

In our first Statnote (*Microbiologist*, June 2005) we described two procedures involving chi-square (χ^2) and the Kolmogorov-Smirnov (KS) test to determine whether a sample of data can be considered to come from a normal distribution. If the sample does not come from a normal distribution then a number of statistics can be calculated that describe the central tendency (mean) and degree of spread of the sample. In addition, we can use our sample of measurements to make inferences about the mean and spread of the population from which the sample has been drawn. This Statnote describes the application of the normal distribution to some common statistical problems including how to determine whether an individual observation is a typical member of a population and how to obtain the *confidence interval* for a sample mean.

The scenario

A hypothetical experiment was carried out to investigate the efficacy of a novel media supplement in promoting the development of cell biomass. Two 10-litre fermentation vessels were sterilised and filled with identical growth media with the exception that the media in one of the vessels was supplemented with 10ml of the novel compound under investigation. Both vessels were allowed to equilibrate and were subject to identical environmental/incubation conditions. The vessels were then inoculated with a culture of *Bacterium 'x'* at an equal culture density and the fermentation allowed to proceed until all the available nutrients had been exhausted and growth had ceased. The entire volume of culture media in each fermentation vessel was then removed and filtered to recover the bacterial biomass which was subsequently dried and the dry weight of cells measured. This experiment was repeated 25 times and the dry weight of biomass produced in each experiment recorded in the table at right (Table 1). This Statnote will only be concerned with analysis of the data from the supplemented culture and in Statnote 3 (*Microbiologist*, December 2005) the same scenario will be used to describe how to determine the significance of any difference between media with and without supplement.

How are the calculations done?

Describing the normal

If our sample of measurements of bacterial biomass (N = 25) on supplemented media (X) is plotted as a *frequency distribution* (Fig. 1), the measurements appear to be more or less symmetrically distributed around a central tendency or average value. If the number of measurements were to be increased to a large number and the class intervals

of the distribution reduced to zero, the data would approximate closely to a bell-shaped curve called the normal distribution (also known as a Gaussian distribution). Many measurements in the biosciences follow this type of distribution. In the present case, the sample data did not deviate significantly from normal as indicated by a KS test (see Statnote 1).

The normal distribution can be described by two statistics:

(a) The average or *arithmetic mean* of the population ($\mu = \Sigma x/n$) where 'x' stands for each item in the sample taken successively. Note that the mean of a sample of measurements taken from this population is designated as 'X*' or 'x*'.

(b) The *standard deviation* (SD) of the population, i.e., the distance from the mean to the point of maximum slope on the curve ($SD = \sqrt{\Sigma(x - \mu)^2/n}$). Hence, the SD describes how close the data cluster around the mean. Note that the SD of a population is given the symbol σ while that of a sample is often designated as 's' or 'σ_{n-1}'.

To calculate the SD we need to know 'μ', the mean of the population. However, in most circumstances we wish to calculate the SD of a small sample of measurements taken from a much larger population. In this case, we do not know the exact value of 'μ' but we can calculate the sample mean 'X*'. Hence, to calculate the SD of a sample of measurements we can use the formula for the SD defined above but with three changes:

(a) The SD of the population 'σ' is replaced by the symbol 's', the SD of the sample.

(b) μ is replaced by X*, the mean of the sample.

(c) 'n' is replaced by 'n-1', a quantity called the *degrees of freedom* (DF).

The calculation of the SD involves the subtraction of individual observations from their mean, which are then squared and summed. However, if there are 'n' observations, once 'n - 1' observations have been subtracted from the mean, we can immediately calculate the last deviation because the sum of all of the deviations from the mean would be zero. In other words, 'n' observations only provide 'n - 1' *independent* estimates of the deviations from the mean. As a general rule, the DF of a statistical quantity is the number of observations making up that quantity minus the number of parameters that have to be calculated from the data to obtain that quantity.

Hence, the formula for the SD of a sample is:

$s = \sqrt{\Sigma (x - X^*)^2/n - 1}$.

If several estimates of the same quantity are made in a study, it is common practice to report the mean and the SD of the sample. In the present example, we would describe our sample of biomass measurements on supplemented media as having a mean of 604.28 and an SD of 21.16.

Another useful way of expressing the variability of a sample is as the *coefficient of variation* (CV) defined as the SD expressed as a percentage of the mean:

$CV = s \times 100/x^*$

The CV provides a *standardised* method of expressing the variability of a measurement in an experiment. Different variables in the biosciences often have characteristic CVs that are stable across experiments, so it may be possible to obtain an estimate of the variability of a quantity in advance by examining the results of previous experiments. The CV is therefore useful in planning experiments. In the present case, the CV for the supplemented data is 3.5%.

Table 1. Dry weight of bacterial biomass under unsupplemented (US) and supplemented (S) growth conditions in a sample of 25 fermentation vessels.

US	S	US	S	US	S
461	562	506	607	518	617
472	573	502	600	527	622
473	574	501	603	524	626
481	581	505	605	529	628
482	582	508	607	537	631
482	586	500	609	535	637
494	591	513	611	542	645
493	592	512	611		
495	592	511	615		

The equation of the normal distribution

The mathematical equation that describes the normal distribution is given as follows:

$y = 1/\sigma\sqrt{2\pi}\ (e^{-(x-\mu)^2/2\sigma^2})$ (Snedecor & Cochran 1980)

This equation enables the height of the normal curve (y), to be calculated for each individual value of 'x' providing that 'μ' and 'σ' are known. This equation also enables the proportion of observations that fall a given distance from the mean to be calculated. In any normal distribution, approximately 68% of the observations will fall one SD above and below the mean. Hence, the probability is 68% or P=0.68 that a single measurement from a normal distribution will fall between these limits. Similarly, the probability is P=0.95 that a single measurement will fall approximately two SD above and below the mean. Each type of variable has a characteristic normal distribution of values with a typical mean and standard deviation. However, statistical tables of the normal distribution, called 'z' tables, have been calculated for a distribution termed *'the standard normal distribution.'* If we wish to use these tables in statistical tests, then we have to convert our measurements so that they are members of the standard normal distribution.

Is a single observation typical of the population?

The standard normal distribution has a mean of zero ($\mu = 0$) and a standard deviation of one unit ($\sigma = 1$) and provides the basis of many useful tests. For example, it may be important to determine whether a single observation 'x' is a typical or atypical of a population of measurements. To make this test, the original observation 'x' has to be converted so that it becomes a member of the standard normal distribution 'z':

$z = \pm (x - \mu)/\sigma$

Tables of the standard normal distribution can then be used to determine where 'z' is located relative to the mean of the distribution, i.e., does it fall near the mean of the distribution (a typical value) or out in one of the tails of the distribution (an atypical value).

An important question is how atypical does 'z' have to be before we would consider it not to be a member of the population? By convention, we will consider 'x' to be a typical member of the population unless it is located in the tails of the distribution which include the 5% most extreme values. The value of 'z' that separates

the typical values (95% of the distribution) from the atypical values (5% of the distribution) is actually 1.96. Hence, if our calculated value of 'z' is equal to or greater than 1.96, we would consider the measurement to be atypical.

As an example, assume that we make an additional estimate (x) of bacterial biomass under supplemented conditions and obtain a value of 550. Is this value typical of the 'population' of values defined in Fig 1. Subtract the mean from 'x' and divide by the SD to convert 'x' to 'z'. A value of z = -2.56 was obtained which is greater than 1.96, the value of 'z' that cuts off the 5% most extreme observations in the population. Hence, 550 is not typical of the values obtained previously and there would be some doubt as to whether the conditions of the original experiment had been exactly reproduced in making our additional estimate of 'x'.

The variation of sample means

If we repeated the study on supplemented media with several samples of 25 we would not necessarily obtain the same mean value each time, i.e., the means of samples also exhibit variability. In this case, we might want to know how good an estimate our individual sample mean was of the population mean. To answer this question requires knowledge of how means from a normal distribution of individual measurements themselves vary. To understand this concept, it is necessary to quote an important statistical result termed *'The Central Limit Theorem.'* This states that means from a normal distribution of individual values are themselves normally distributed with mean 'μ' and SD s/√n, where 'n' is the number of observations in the sample. In addition, the means of many non-normal distributions will be normally distributed as long as the samples are large enough. It is important to distinguish the quantity s/√n, the SD of the population of sample means or *'standard error of the mean'* from 'σ' or 's' the SD of a population or sample of individual measurements.

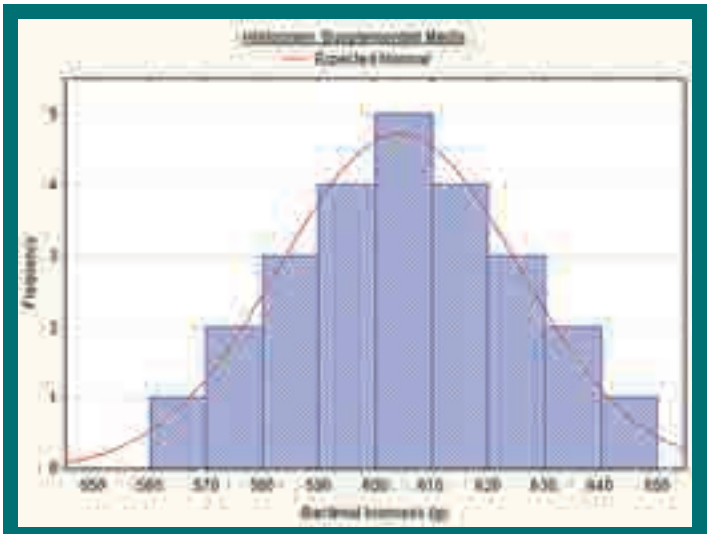


Figure 1. *Frequency distribution of bacterial biomass on supplemented media. Fitting the normal distribution KS = 0.079, P > 0.05).*

How to fit confidence intervals to a sample mean

The standard error of the mean is often plotted on a graph as a *confidence interval* or error bar, and indicates the degree of confidence that we have in our sample mean as an estimate of the population mean. Confidence intervals are calculated as follows:

(a) If a single observation 'x' comes from a normal distribution then the probability is 95% (P = 0.95) that 'x' will be located somewhere in the distribution between $\mu \pm 1.96\sigma$.

(b) Similarly, if a sample mean X* comes from a normal population of sample means then P = 0.95, that X* lies between $\mu \pm 1.96\ \sigma/\sqrt{n}$.

(c) Hence, we can write P = 0.95 that μ lies between $X^* \pm 1.96\ \sigma/\sqrt{n}$.

There are two problems with this approach. First, in the majority of studies, the sample mean X* is based on a small sample of measurements. Hence, we do not know the value of 'σ' only the SD of the sample 's'. Hence, we substitute 's' for 'σ'. Second, we cannot be certain about the exact shape of the distribution and therefore whether the value of Z = 1.96 is accurate enough to judge whether a sample mean is atypical of the population. Instead, we use a different value that more accurately describes the behavior of small samples, *viz.*, a value from a related distribution called the 't' distribution. The 't' distribution will be discussed in more detail in the next Statnote.

(d) Hence, the 95% confidence interval (CI) of a sample mean is given as $CI = X^* \pm$ 't' (P = 0.05, DF = n - 1) s/√n. For our supplemented biomass data, the 95% CI were estimated to be 604.28 ± 8.72.

Therefore, we are 95% confident that the population mean will fall between the calculated limits. The 95% confidence intervals are often plotted as error bars. It is important to be clear what the error bar represents since investigators may plot the SD of a sample, the standard error of the sample mean, or the 95% confidence intervals and each conveys different information. In addition, error bars must not be used to make judgments as to whether there are significant differences between two or more means on a graph. The confidence intervals of two sample means are calculated using the standard errors appropriate to those sample means alone. To test whether the two means are different requires another form of standard error, i.e., the *'standard error of the difference between two means'*, and this will be discussed in Statnote 3.

Conclusions

If a sample of measurements comes from a population that is normally distributed, we can use several statistics to describe our sample, such as the mean, SD, and CV. In addition, we can determine how atypical an individual measurement has to be before we would consider it not to be a member of a specific population.

Furthermore, we can use our sample to make inferences about the population from which the sample is drawn including making estimates of the population mean and fitting confidence intervals to a sample mean.

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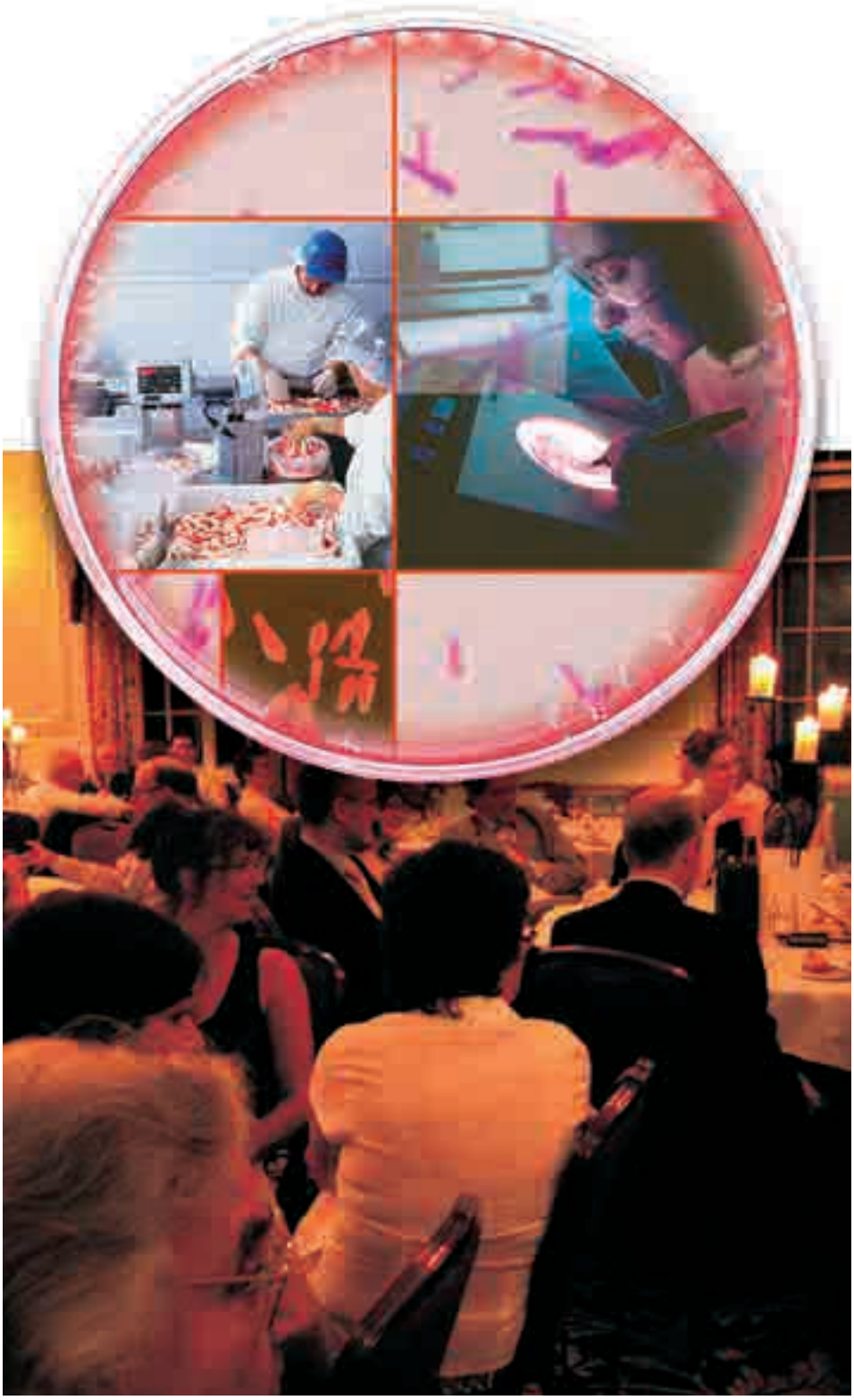
Dr Richard Armstrong and Dr Anthony Hilton
Life and Health Sciences, Aston University

Spore forming bacteria — emerging and re-emerging issues

Old Ship Hotel, Brighton, UK ● 4th - 7th July 2005



THE CONFERENCE STARTED on the Monday evening with the Lewis B Perry Memorial Lecture given by Grahame Gould from the Department of Food Science, University of Leeds, on **History of Science; spore forming bacteria.**

This was a friendly and informative ramble through the ancient and modern of bacteria spores—from their discovery 130 years ago to recent research on the use of high hydrostatic pressure to prevent food poisoning without altering flavour. He highlighted how surprisingly little we know about some aspects of the physiology of these bacteria and their spores. Many of the points he raised came up later during the rest of the conference. The talk was followed by one of SFAM's justifiably famed 'free-bar mixers'. The Tuesday morning session was **An Update on the Taxonomy and Physiology of Spore Formers** with Grahame Gould in the Chair. The first lecture on **Progress in the taxonomy of aerobic endospore formers** was given by Niall Logan of the Department of Biological and Biomedical Sciences, Glasgow Caledonian University. Niall pointed out that he last spoke at an SFAM conference 25 years ago at the 50th anniversary meeting. Since then, developments in molecular biology have led to a large increase in genera and species. At present there are 273 species, some of which derive from *Bacillus* and some from other genera. Unfortunately the database is rather narrow and many of the species have few strains listed. Niall concluded with a cartoon from the Beano, which involved a boy with a pet named Alexander Lemming walking on thin ice and falling through. According to Niall this illustrates the state of *Bacillus* taxonomy.

The second talk was by Marjon Wells-Bennik from Nizo Food Research, Department of Health and Safety, The Netherlands, on **Sporulation and germination in Bacilli and Clostridia.** She started by pointing out that a surprising number of spore forming bacteria have been sequenced, especially *Bacillus spps*. She showed how molecular biology has progressed our knowledge of the stress response, sporulation and germination in the two genera. A huge amount is now known about these processes at the molecular/gene level, indeed she left me with the impression that this rather outstrips what we know at the biological level.

Marjon was followed by Peter Setlow of the Department of Molecular, Microbial and Structural Biology, University of Connecticut health Centre, who spoke on **Mechanisms of the resistance of bacterial spores to heat, radiation and chemicals.** He explained how the structure of the spore confers resistance and showed that wet heat resistance in spores is 40°C higher in *Bacillus* spores compared to vegetative cells. Following on from a theme in Grahame Gould's first talk, he ran through the factors involved in the resistance of spores to wet heat: low water content, dipicolinic acid, the amount and type of mineral content, and the protection of DNA by small acid-soluble spore proteins (SASP). He warned that we should be cognisant that most of what we know about resistance in spores comes mainly from *Bacillus subtilis*. He spoke movingly of how he had been able to continue work carried out by his father

(published in Science in 1963) and rather gleefully on how spore research has kept him in gainful employment and paid for his children's education so that they would leave home.

Following a coffee break, Anne Moir of the Department of Molecular Biology and Biotechnology, University of Sheffield, presented *How spores germinate.* She explained how this involved interpreting the abundance of old physiological data in relation to up-to-date molecular biology. Most spore formers have multiple receptors to different germination stimulants (germinants). Spore germination is an extreme example of a signal transduction system, in which interaction between small molecule germinant and receptor protein results in dramatic changes in spore structure properties, without the need for any new macromolecular synthesis. The story is not complete, for example, little is known about the enzymic degradation of the spore coat.

Michèlle Mock, from the Unité des Toxines et Pathogenié Bactérienne, Institut Pasteur, Paris, discussed *Bacillus anthracis: spore structure and immune response.* Anthrax spores have always been likely candidates for use in bio terrorism and in the current climate it is important that we have efficacious vaccines. The immune system is first in contact with the exosporium, the outermost integument of the spore. The exosporium contains carbohydrate, protein and lipids but it is a collagen-like protein that is immuno-dominant. Michèlle described molecular work involving the structure and immunogenic properties of the protein. She then discussed the use of live vaccines in veterinary medicine and a non-living vaccine for use with humans.

The last talk in the morning session was by Oscar Kuipers of the Department of Genetics, Groningen Biomolecular Sciences and Biotechnology Institute, The Netherlands, on **Single cell analysis of gene expression patterns of competence development and initiation of sporulation in *Bacillus subtilis;* on the origin of bistability.** Some pathogenic bacteria are able to develop natural competence (uptake of DNA from the immediate environment and become transformed), which can lead to serious problems in relation to the acquisition of multiple resistance to antibiotics. Oscar's group have shown that populations of *B. subtilis* initiate both competence and sporulation in a sequential manner, but not simultaneously.

The afternoon session was on **Spore Former and Food Microbiology** and was chaired by Martin Adams. The first paper was given by Lieve Herman from the Department of Animal Product Quality, Centre for Agricultural Research, Belgium, and was on ***Bacillus spermodurans* and other spore formers in milk.** *B. sporothermodurans* can produce heat resistant spores that may survive UHT treatment of milk resulting in undesired growth. Molecular typing of isolates from UHT treated milk from diverse countries showed that heat resistant clones exist (HRS-clone). They are thought to have come from one source and are spread by rodents. Work carried out in Belgium showed that filter cloth, green crop and fodder are rich in HRS-clone spores. Exposure of the bacterium to sub lethal stresses such as hydrogen peroxide induced heat resistant spores, indicating that extreme heat resistance is multifactorial. This resistance is lost during normal growth.

This was followed by a paper given by Mike Peck from the Food Safety and Computational Microbiology Group, Institute of Food Research, Norwich, on **Non-proteolytic *Clostridium botulinum* and the safety of minimally heated foods: an emerging problem.** Sales of minimally processed refrigerated foods are increasing in response to consumer demand for foods of high quality that require little preparation. They are often heated in-pack and microbiological safety depends on a minimal heat treatment, refrigeration and a restricted shelf life. Mike explained that non-proteolytic *Cl. botulinum* has emerged as a potential pathogen to exploit this new niche because it is able to produce resistant spores and form a potent neurotoxin at refrigeration temperatures. He showed that six different types of bacteria can produce the toxin and gave a overview of what needs to be done in food processing, e.g., low pH 5, high sodium chloride concentration, correct chill temperature and low water content, to mitigate against

growth of non-proteolytic *Cl. botulinum*.

Christina Silva of the Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal, spoke next on **Thermal inactivation of Alicyclobacillus acidoterrestris spores in fruit product processing.** *A. acidoterrestris* has been shown to survive pasteurisation and cause off-flavours in commercial pasteurised fruit juices. Its spores are more resistant than other spoilage organisms in acid foods and it is used to test and evaluate the design of hot-filling and continuous pasteurisation conditions used in tropical fruit juices and pulps. Christina presented a critical review on the inactivation kinetics of *A. acidoterrestris* spores and their use in predictive microbiology and the optimisation of process design. She showed that this is appropriate technology that has been used to help poor farmers to keep and treat their product—Cupuacu[1] in the Amazon region where bad weather can prevent immediate export.

The last session of the day was given over to offered papers. Jeroen Heyrman from the Laboratory of Microbiology, Ghent University, Belgium, spoke on **Multi locus sequence analysis (MLSA) of the *Bacillus subtilis*-group.** There are ten species in the *B. subtilis* group with a range of human-related activities, e.g., food poisoning and food spoilage. Unfortunately it is difficult to speciate them using phenotypic methods. To solve this problem the group at Ghent University have been using MLSA. They found that, although it allows straightforward identification of members of the *Bacillus subtilis*-group, the housekeeping genes used are not diverse enough to link the sequence information to the clinically important toxin production. It is hoped that by using DNA-DNA relatedness and employing non housekeeping sequences, such as protein-coding sequences, more discrimination will be possible and permit the rapid identification of harmful strains.

This was followed by Will Waites from the School of Biosciences, University of Nottingham and the Korea Food Research Institute, who spoke on the **Effect of stress during sporulation on the heat resistance of spores of *Bacillus subtilis*.** Stress causes the production of new proteins that protect against further stress. Some of these are general stress proteins and others are stress specific proteins. Previous workers have shown that heat applied early in sporulation increases spore heat resistance in B*acillus megaterium*, *B. subtilis*, *Clostridium perfringens* and *C. botulinum*. Will's group has shown that stress proteins do not repaire heat damage during spore germination and outgrowth, but change the structure of spores formed, resulting in altered resistance. Precise sporulation conditions have large effects on many different spore properties including the core water and the structure of both the cortex and coat. They state that the most heat resistant spores should always be used in laboratory tests and that storage trial spores produced from heat stressed cells should be tested against those formed by unstressed cells.

The early evening was spent at a finger buffet and attempting a quiz/treasure hunt run by the Trade Show exhibitors. This was a cunning plan to get delegates to interrogate the exhibits but it was also great fun. It provided a good opportunity to meet so many friends from the trade show who regularly attend conferences. I still cannot believe that I didn't win a prize!

Wednesday morning was taken up by a session on Health/Therapeutics and was chaired by Keith Jones. The first paper was given by Simon Cutting of the School of Biological Sciences, Royal Holloway University of London, on **The use of *Bacillus subtilis spores* as oral vaccines.** Simon explained that his research, into the use of bacterial spores as heat-stable delivery systems, was stimulated by visiting Asia and seeing people die of diseases that could be prevented by vaccines. He wanted vaccines that are robust and can be stored at room temperatures. He described some edible vaccines (oral/nasal route) that are already in use and how his group have engineered *B. subtilis* spores to express tetanus and anthrax toxins to work as a booster[2]. The second paper was given by Josef Anne from the Rega Institute, Katholieke Universiteit Leuven, Belgium, on ***Clostridium* spores as mediators to target therapeutics.** Josef pointed out that as early as the 1890s patients were seen to recover from cancers are becoming post-operatively infected with clostridia. It transpires that anaerobic spore formers such as clostridia are able to colonise hypoxic regions in solid cancer tumours. As they can also be engineered to excrete cytotoxic proteins, such as tumour necrosis factor-á and interleukin 2 and prodrug-coverting enzymes, it should be possible to use them as delivery systems to attack specific regions of solid tumours.

Josef was followed by Anne-Brit Kolste from the School of Pharmacy, University of Oslo, Norway, who spoke on **The *Bacillus cereus* group: what's in a name?** Anne-Brit explained that, although we see the three members of the *Bacillus cereus* group as having widely different functions (*B. cereus* caused food poisoning and food spoilage, *B. anthracis* causes anthrax and *B. thuringiensis* is used in the

biological control of insects) they are in fact very closely related species. Apart from the insect toxins, *B. cereus* and *B. thuringiensis* have a similar repertoire of virulence factors and, although these virulence factors themselves are inactive in *B. anthracis*, the genes are present. Anne-Brit posed the following questions. Do plasmids transfer variability between the species? Are environmental strains pathogenic? Do we need to reconsider the species concept for this group?

Ian Poxton from Medical Microbiology, Centre for Infectious Diseases, University of Edinburgh College of Medicine and Veterinary Medicine, spoke next on ***Clostridium difficile.*** *C. difficile* is the major cause of nosocomial diarrhoea and pseudomembranous colitis in the developed world. In many hospitals infection rates are higher than with MRSA. The recent outbreak at Stoke Mandeville hospital has brought it into the public arena once more. The bacterium multiplies in the gut and the spores are shed in faeces. *C. difficile* spores are spread by the faecal/oral route and are found in hospitals on fomites, such as telephones. Antibiotic treatment compromises the 'colonisation resistance' of the normal gut microbiota and allows *C. difficile* to multiply. Susceptibility is dependent on the immune status of the patient. It is thought that some of the recent outbreaks worldwide are associated with hyper-virulent strains. Ian suggests that many questions need to be answered before this disease can be brought under control and that a good place to start is the February 2005 issue of the *Journal of Medical Microbiology*, which is dedicated to *C. difficile*.


The treasure hunt was a great success

The paper on **Past, imminent and future anthrax vaccines** was given by Les Baillie, Head of the Biodefense Vaccine Department, Biological Defense Research Directorate, Naval Medical Centre, Rockville, Maryland, USA. Les pointed out that bio threats can be relatively low tech and suggested that different sections of the community would respond differently to a bio attack, i.e., the military would follow orders but the general public may not and would insist on asking questions (or words to that effect). Recent events have highlighted the need to develop vaccines capable of protecting both military and civilian populations. Les discussed the work being done to develop more effective vaccines against anthrax and emphasised the huge costs involved and the long lead in times for production. This has lead to research on multi-agent vaccines and the production of multiple DNA and combined anthrax/plague vaccines.

The last paper of this session was an offered paper by Moira Johnson from the Safety and Environmental Assurance Centre, Unilever, on **Evaluation of hydrogen peroxide vapour as a method for the decontamination of surfaces contaminated with *Clostridium botulinum* spores.** *C. botulinum* produces an extremely potent neurotoxin that causes human botulism. Although it is relatively rare, the prevention of outbreaks is a major concern due to the severity (and often fatality) of the disease. Problems arise in the food industry due to an increasing consumer demand for healthier, less heavily processed, less preserved and more natural products; and in the search for safer antitoxins and vaccines to control naturally acquired forms of botulism and to meet the threat of the use of botulinum toxin as an agent of bioterrorism. Botulinum toxin is also used in clinically safe amount for reduction in pain, the control of spasticity and as a cosmetic (anti-ageing). With so many varied research programmes relating to this potentially fatal organism there is a requirement for decontamination of areas where this organism has been handled. In the past formaldehyde has been used but in June 2004 the International Agency for Research on Cancer (a division of the WHO) classified formaldehyde as carcinogenic to humans. Moira discussed the use of hydrogen peroxide vapour (HPV) as a decontaminant. It is environmentally friendly; leaves no residues and therefore requires no subsequent cleaning; has the best safety profile of the gaseous decontamination methods available and is already widely used for decontamination of: laboratory & medical equipment; hospital wards; pharmaceutical manufacturing facilities; and animal houses. Moira presented data that showed that HPV is effective at deactivating spores of toxigenic *Cl. botulinum*, non-toxigenic *Clostridium spp*. and *Geobacillus stearothermophilus* dried onto stainless steel surfaces.

The afternoon session was on Animal Health with Colin Harwood in the Chair.

The first paper on **The use of *Bacillus subtilis* spores as oral vaccines** was given by Le Hong Duc, School of Biological Sciences, Royal Holloway University of London. *Bacillus subtilis* is widely used as a probiotic in SE Asia. The spores germinate in the gut and the vegetative cells multiply where they have been shown to competitively exclude pathogens, stimulate the immune system and produce vitamins and antimicrobials. We can build on this acceptance of *Bacillus* spores to use them as vehicles for vaccines (see the earlier presentation by Simon Cutting). Bacterial spores are robust bio particles that can be exploited for vaccines where there is a need for heat-stable carrier systems that can deliver heterologous antigens to the mucosa. Le discussed

work on the engineering of *B. subtilis* spores to express antigenic characteristics of *B. anthracis*, which on germination in the gut leads to antibody/antitoxin production. He suggested that this spore-mediated delivery system could be used in vaccination against viral diseases.

The next paper was given by Peter Silley, MB Consult Limited and Don Whitely Scientific Limited, on **Do bacteria need to be regulated?** Peter answered the question in the title in the affirmative and started with a tour of the EU regulations applying to the approval of *Bacillus* in animal products. He then used Calsporin, which is used to modulate the GI flora in poultry, as an example. He listed the topics that need to be addressed: 1. Nomenclature- proof that it is *B. subtilis*; 2. Origin- where does it come from? 3. Data on physiology, growth and survival; 4. Stability- phenotypic, genotypic and plasmids; 5. Tests for toxins and virulence factors; 6. Antibiotic production; 7. Effects on normal microflora of the GI tract; 8. Survival in the GI and faeces. He concluded, reassuringly, that the public should have confidence that bacteria used in animal nutrition are being effectively regulated. After attending last year's SFAM Summer conference in Cork, I wish that the same could be said for the use of bacteria as probiotics in humans.

Rachel Compton, also from Don Whitley Scientific Limited, replaced the advertised speaker (Shabbir Simjee) and spoke on **Necrotic enteritis, *Clostridium perfringens* and its control by the use of antibiotics.** Necrotic enteritis is an economically important disease in poultry that is kept under control by the use of in-feed antibiotics. Rachel described the progression of the disease and the symptoms in poultry. She held out hope that a vaccine is being developed and relayed the worries and economic consequences that may arise with the phasing out of the use of antibiotic growth promoters in 2006.

The next session of the conference was devoted to Student Offered Papers chaired by Peter Silley, the outgoing SFAM President. The presentations were given with enthusiasm, confidence and accompanied by excellent graphics. (see panel at right).

The student papers were followed by the **W H Pierce Memorial Prize** Lecture given by Andrew McBain from the School of Pharmacy, University of Manchester, on **Mammalian microbionomics: the need for molecular ecological approaches.** Andrew defined mammalian microbionomics as 'the host together with its symbionts and pathogens', and pointed out that the number of bacteria in humans (10^{14}) outnumber human cells (10^{13}) by 10:1 and that microorganisms in the colon are as metabolically active the liver. Procaryotic organisms in the gut have effects on immune development, nutrition, vitamin synthesis, obesity and cancer. He then discussed his work using denaturing gradient gel electrophoresis (DGGE) to study periodontal biofilms[3].

The Annual General Meeting followed in which Margaret Patterson was elected as the new SFAM President to replace Peter Silley. I would like to express my appreciation of Peter's highly active and visible efforts in pursuit of SFAM's aims and to wish Margaret every success.

Winner of the Oral Presentation, Elaine Black, receives her prize

The Society Dinner was a truly memorable affair (it must have been because it induced a severe memory loss in me) that was enlivened by the presence of a conjurer. He went from table to table and performed admirably and expertly (that is 'undetected'), given the level of boisterous interference. This was also the occasion for speeches from the outgoing and incoming presidents and the awarding of prizes to the winners of the oral and poster presentations.

The last session of the conference was on Environment/Applications and was chaired by Margaret Patterson the incoming SFAM President.

The first paper **Spore-forming enteropathogenic bacteria** was given by Neil Crickmore, School of Life Sciences, University of Sussex, Brighton. The group of spore-forming bacteria that includes *B. thuringiensis*, *B. sphaericus*, *Penibacillus popilliae*, *Brevibacillus laterosporus and Cl. bifermentans*, all synthesise insecticidal toxins with potential use as biopesticides. *B. thuringiensis* (Bt) is the best known and has been used commercially for many years. Since the mid 1990's transgenic plants expressing Bt toxins have also been commercialised. The bacteria are found ubiquitously in the environment but the primary natural habitat is thought to be the insect gut. Neil discussed the ecology of the bacteria and pointed out that, although they have been used successfully, there is a down side. Some insects have acquired resistance; the toxins are not as effective as chemical insecticides; and not all insects are susceptible. He discussed the advantages of putting the toxin in *Asticcacaulis excentricus*, a Gram negative bacterium, to kill mosquito larvae in still waters such as car tyres and tin cans, and

Student Offered Papers

DNA extraction efficiency for commercially available magnetic beads by **Bee-Ann Yeap**, School of Pharmacy and Biomolecular Sciences, University of Brighton.

Oral administration of Bacillus subtilis to poultry: An alternative approach towards prophylactic control of *Clostridium perfringens*-associated necrotic enteritis by **Stephen Cartman**, Department of Food and Environmental Safety, Veterinary Laboratories Agency, Weybridge.

Inactivation of *Bacillus* spores in milk and buffer by the application of a combination of high pressure, mild heat and nisin by **Elaine Black**, Department of food and Nutritional Sciences, and Department of Microbiology, both at University College Cork.

Consequences on surface contamination of *Bacillus cereus* spore injury during food processing by **Gregoire Tauveron**, INRA de Lille, France.

Comparison of in vitro cytotoxicity of *Fusarium* mycotoxins, deoxynivalenol, T-2 toxin and zearlenone on selected human epithelial cell lines by **Tim Calvert**, School of Biological and Biomedical Sciences, Glasgow Caledonian University.

Survival kinetics and stress resistance of *Bifidobacterium spp.* Show their different viabilities in bio-yoghurts and gut by **Vijith Jayamanne**, School of Biomedical and Molecular Sciences, University of Surrey, Guildford.

pointed out that new toxins are being discovered all the time and, hopefully, there will soon be one active against locusts.

Just before the next paper, Margaret had the difficult task of announcing the terrorist explosions in London and the probable effects this would have on travel arrangements. Despite the obvious distraction this caused, the conference proceeded normally, albeit with less than normal concentration. The subsequent speakers performed admirably in the circumstances.

The second paper was given by C J Hodgson from the School of Applied Sciences, University of Huddersfield, on

Practical applications of the biotracer *Bacillus globigii*. The aim of this work was to test use of antibiotic resistant endospores of *B. globijii* to monitor effluent retention times in a free water surface constructed wetland. The spores were easily detected, even in microbial rich waters, but the recovery rate was rather low and this method may not be suited to constructed wetlands.

Colin Harwood of Cell and Molecular Biosciences, Newcastle University, came next with his presentation ***Bacillus* protein secretion: a game of snakes and ladders.** *Bacillus* species have the potential to secrete proteins at yields of over 20gL^{-1} of culture but the mechanisms employed by the bacterium to prevent mistakes in protein folding make it difficult for this potential to be realised. Colin illustrated the intricate molecular biology behind protein secretion and folding by referring to deleterious factors as snakes and to facilitating factors as ladders.

After a coffee break, Barry Seddon, School of Biological Sciences,

Department of Agriculture and Foresty, University of Aberdeen, presented a paper entitled **Spore forming bacteria and biocontrol of fungal plant pathogens: crop protection with *B. brevis*.** This was Barry's valedictory lecture; he will have retired by the time this report is in print. I wish him well. Anyone who can remember all the words to the Lone Ranger theme tune (sung by Barry during the Society Dinner) will be popular in all the retirement haunts around Aberdeen. Many bacterial spore formers produce antifungal substances and, since bacterial spores are resistant to desiccation, organic solvents and the conditions of the crop environment—properties that lend them to formulation procedures, they can act as biocontrol agents. Barry presented the pros and cons of using antifungal spore formers in this way and discussed his work with *B. brevis*, which produces the fungicide, *Gramicidin S*. The bacterium also produces a biosurfactant that increases the rate of drying of plant surfaces and leads to reduces germination of conidia. These properties combine together in the biocontrol of fungal pathogens.

The final speaker at the conference was Helmut König of the Institute of Microbiology and Wine Research, Johannes Gutenberg University, Mainz, Germany, who spoke on ***Bacillus* species in the intestine of termites and other soil invertebrates.** The guts of invertebrates such as termites, collembola, isopoda, and millipedes are full of bacteria, fungi and protozoa (many are which are archaezoa—eukaryotes without mitochondria). The bacteria are mainly made up of spirochetes but *Bacillus* and *Paenibacillus* are also present together with anaerobic cellulytic bacteria typical of the rumen. The main function of the microorganisms appears to be the digestion of cellulose and hemicellulose and the fermentation of the digestion products to fatty acids such as acetate. Although termites have the genes for producing cellulases they appear to rely on flagellates for the enzyme. Surprisingly, at least to me, termites rely on acetate for a source of carbon, rather in the same way as the large ruminants do. Nitrogen fixation may well be another role for the bacilli since they contain active nitrogenases and the diet of termites has a high C:N ratio.

Overall, this has been a most excellent conference. On behalf of the organisers of the scientific programme, Julie Eastgate, Niall Logan, Martin Adams and myself, I wish to thank all of the speakers who gave interesting, informative and accessible presentations, giving the Chairs an exceptional easy ride. If I have misinterpreted anybody's presentation, I apologise herewith.

The social programme was terrific and the location splendid. From a personal point of view, it is such a pleasure to meet microbiologists working in such diverse areas of applied microbiology, and networking with them and the Trade Show delegates is a real bonus. Lastly I would like to thank Margaret, Marisa and the other SfAM staff who smoothed the arrangements so that everyone managed to get back despite the closure of Brighton and London railway stations.

References

■ **1.** Cupuacu *(Theobroma grandiflorum)* is a small to medium tree in the Rainforest canopy which belongs to the Cocoa family and can reach up to 20 meters in height. Cupuacu fruit has been a primary food source in the rainforest for both indigenous peoples and animals alike. The Cupuacu fruit is known for its creamy exotic tasting pulp. The pulp is used throughout Brazil and Peru to make fresh juice, ice cream, jam and tarts. The fruit ripens in the rainy months from January to April and is considered a culinary delicacy in South American cities where demand outstrips supply. www.amazonlink.org/biopiracy/cupuacu.htm

■ **2.** Duc et al., (2003) Bacterial spores as vaccine vehicles. *Infection and Immunity* **71**, 2810-2818.

■ **3.** McBain *et al.,* (2003) Growth and molecular characterization of dental plaque microcosms. *Journal of Applied Microbiology* **94** 655-664.

Keith Jones
Lancaster University

Am I eligible - can I apply?

Grants can be made available to ANY FULL member who is able to offer a suitable undergraduate student a work placement for a period of up to 10 weeks during summer. The grant is £160 per week for the student for a maximum of 10 weeks and up to £50 per week for lab costs for a maximum of 10 weeks. To apply, visit **www.sfam.org.uk/members/prizes.php**

GUIDELINES

1. Any full member of the Society who can offer an undergraduate student, or a recent graduate (within 6 months of graduation) a work placement is eligible to apply for this grant. The placement can last up to a maximum of 10 weeks, normally during the summer vacation.

2. The Grant will normally provide support at the rate of £160 per week for the student and up to £50 per week for lab costs. The monies will usually be paid to the Department in which the student/graduate works unless a specific request is made for an alternative method of payment.

3. Applications should be made by the supervisor using the PDF form provided on the website or the paper form obtainable from the Society Office.

4. Successful applicants and their students/graduate must write a report on the placement within 4 weeks of completing their placement which will be published in *Microbiologist*. Photographs of the applicant and/or the work done during the placement are desirable. These should be supplied as (a) digital images at a size of not less than 4 inches square at a resolution of not less than 300 pixels per inch, or (b) original photographic prints which will be scanned and promptly returned.

5. Normally a member may not apply for a further grant until a period of two years has elapsed.

6.There is no closing date for this Grant and applications can be made any time during the year. Applicants must apply at least 6 weeks before the proposed start date.

www.sfam.org.uk/members/prizes.php

The use of aged garlic in the prevention of glycation of growth factors. **Katie Murcott** reports on her project

AGED GARLIC EXTRACT HAS been found to be effective in preventing glycation of growth factors, which is a reaction between an amino group from a protein and a free carbonyl group from a reducing sugar.

This is a problem that is frequently seen in wound healing among diabetic patients. As these patients have a depressed blood supply the treatment of infection caused by wounds and ulcers is often difficult, as systemic treatments can be ineffective. Topical treatments for such wounds are already used but with the increase of resistant bacteria, research into other non-toxic substances is essential. A large proportion of research is being tailored towards more natural products. Aged garlic (garlic that has been aged for approximately twenty months), like fresh garlic, is said to possess antimicrobial capabilities, thus, finding a product that would be effective in preventing or reducing glycation and which is also antimicrobial, would be of great benefit.

My first week involved looking at the degrees of antimicrobial behaviour exerted by the commercially produced aged garlic extract. Initially, twenty-five bacteria were selected: ten university identified strains of MRSA, six phage typed MRSA, *Staphylococcus haemolyticus* NCTC 1042, *Staphylococcus epidermidis* NCTC 7944, *Staphylococcus epidermidis* NCTC 11047, *Staphylococcus saprophyticus* 8771, *Staphylococcus aureus* T1, T4, ATCC 11195, Oxford NCTC 6571 and NCTC 8325 phage 47 host. Overnight broth cultures were made of each organism and 1 in-100 dilutions were made using the broths. Lawns were prepared using these dilutions on DST agar. The rotary plater was used to do this to allow an even coverage of the agar. Sterile discs inoculated with 20µl of the aged garlic extract were placed on the agar and incubated for 24 hours. The results showed no antimicrobial effect against any of the tested microorganisms. I thought it would be interesting to see if there was any vapour effect exhibited by the aged garlic extract. I decided to compare the effects of the aged garlic with those of fresh garlic whose vapour effect is well known. Again, sterile discs were inoculated with 20µl of the aged garlic, but this time they were placed in the lid. The rotary plater was used to make lawns with all twenty-five microorganisms being used. The results obtained showed little or no effect. The fresh garlic did, however, produce positive results, although some of the plates still produced growth. The most markedly affected microorganism was phage typed MRSA strains.

During the second week I spent several days at Micap, a company that specialises in encapsulation. During my time there I was given an insight into the theory behind encapsulation. I was also able to see the processes involved in the encapsulation of a substance and the types of products that can benefit from such technology.

After returning from Micap, I started performing tests using the multipoint inoculator. This involved incorporating different concentrations of the aged garlic extract, ranging from 4% to 0.03%, into agar and inoculating them with the same 25 bacteria. This was initially carried out using the small stock held by the university. The results obtained were varied and no conclusions were drawn. As there was no growth seen on the control plates I decided to repeat the experiment, only this time I included a control with Columbia agar as the growth medium. This showed that the Columbia agar was better suited to supporting the growth of the microorganisms than DST sugar. It was however decided that a better option would be to use Sensitest agar. The results obtained showed that there was very little or no effect of the aged garlic on the tested bacteria. The only bacteria that showed a positive result was *S.epidermidis* NCTC 11047, whose growth was inhibited at a concentration of 0.25%.

Due to the lack of results obtained from these experiments, it was suggested that I look at garlic pearls. Using the same dilutions as I did for the aged garlic, I tested the pearls against the same twenty-five bacteria using the multipoint inoculator. To obtain the solution inside the pearl they were melted in a water bath, the number of pearls equalling the volume water.

Ensuring the contents of the pearls was sterile before use initially proved to be quite difficult as the solution kept clogging up the sterile filters. The results did not show any inhibitory activity towards the tested bacteria. A vapour test was also set up using garlic pearls whereby three volumes of garlic pearl solution; 10µl, 20µl and 50µl, were added to sterile discs placed in the lid of the plates. Four of the bacteria were chosen as they had been positively affected by the fresh garlic. These were two phage typed MRSA strains, *S.epidermidis* NCTC 11047 and a university identified strain of MRSA. These results again showed no inhibitory activity towards the tested bacteria.

S-Allyl-Cystein and S-Allyl-Mercpato Cystein—two components found in garlic that are able to prevent glycation were also tested, again against the same 25 bacteria using the multipoint inoculator. The results obtained showed no inhibitory effects from the two components.

Upon the university purchasing a new batch of aged garlic extract I repeated the experiments to see if the age of the extract had a bearing on its effectiveness. Unfortunately, there was no inhibition exhibited even when the concentrations of the extract incorporated into the agar were increased to start from 10%. It was suggested that I test a number of gram negative bacteria to see if there was any effect towards them. These were: *Proteus rettgerri* NCTC 9570, *Serratia marcescens* NCIMB 1377, *Salmonella typhimurium* NCTC 9570, *Pseudomonas aeruginosa* NCTC 10331, *Enterobacter aerogenes* NCIMB 10102, *Pseudomonas fluorescens* 10038, *Escherichia coli* 81628, *Escherichia coli* 81937, *Klebsiella oocytooca* 6653, *Klebsiella pneumoniae* 40602, and *Citrobacter frundii* 82073.

MIC in broth was performed using the new batch of aged garlic extract to see if there was a difference between agar incorporation and broth. Initially, only three bacteria were chosen to look at: *E.coli* 81937, MRSA phage group 16 and *S.Aureus* Oxford NCTC 6571. Dilutions of the extract in the broth ranged from 10% to 0.3125%. The only positive result was seen in the MRSA phage group 16 which exhibited minimal growth at 10%. Both the 10% and 5% dilutions were plated to see whether the effects were bactericidal or bacteriostatic. The MIC broth was repeated using the garlic pearl solution; this was carried out using the same three bacteria as before. Due to the difficulty experienced sterile filtering the melted garlic pearls, pasteurisation was used for one run until a larger filter system was located. The positive results showing inhibition were checked by re-inoculating the broths with the organism and incubating again. All results were negative for inhibition.

I performed a garlic extraction in order to make a comparison between commercially produced extract and freshly produced extract. I carried this out using water, acetone and chloroform. The same method for producing the broth dilutions was adopted with the same three bacteria being used to inoculate the broths. The results obtained showed positive inhibition towards the bacteria. The extraction that used water showed the best results with no growth in the dilutions from 10% to 2.5%. The extraction involving acetone and chloroform showed complete inhibition for all the bacteria in 10% and 5% concentration. *S.aureus* Oxford NCTC 6571 was most affected by all the solutions. *E.coli* 81937 and MRSA phage group 16 showed growth at 2.5% for chloroform, however only *E.coli* 81937 was able to grow at 2.5% with acetone. All positive results and the dilutions next to it were plated to see whether the effect was bactericidal or bacteriostatic.

Due to the lack of results it was decided that encapsulation would not be worthwhile. It can therefore be concluded from this that commercially produced aged garlic exhibited no antimicrobial effects and that inhibitory effects were only seen with freshly extracted garlic. The difference in the results between the commercially produced aged garlic and freshly produced extract could be due to the extraction process itself. Also, the concentration of aged garlic was not listed on the bottle so the performance of serial dilutions on the extract may have produced concentrations which were below those that would be needed for the extract to be effective.

It was suggested that other products which are said to have antimicrobial properties should be investigated, these being propolis extract, which is found inside beehives and neem leaf extract from the neem tree. MIC in broth using concentrations ranging from 10% to 0.3125% of the propolis extract were tested against the three bacteria used previously. A control using 95% ethanol was run in parallel as the propolis had been extracted in alcohol which could have a direct influence on the resulting bacterial growth. The results of the ethanol control showed that growth of *E.coli* 81937 was completely inhibited at 10%, showed minimal growth at 5% and 2.5% and normal growth under the remaining concentrations, whilst MRSA phage group 16 was completely inhibited at 10% and 5%, showed minimal growth at 5% and 2.5% and normal growth under the remaining concentrations. *S.aureus* Oxford NCTC 6571 was completely inhibited at all tested concentrations. Due to the solutions being turbid after the addition of the propolis extract each concentration had to be plated to observe any effects. The results of the plated solutions no growth for both MRSA phage group 16 and *S.aureus* Oxford NCTC 6571. The result for *S.aureus* Oxford NCTC 6571 could however also be due to the ethanol. *E.coli* 81937 was only inhibited at 10%.

The multipoint inoculator test was also carried out using all thirty-six bacteria. The concentrations of propolis ranged from 5% to 0.039%. The results showed that propolis extract was effective against Gram positive bacteria up to a concentration of 0.3125%, except for *S.epidermidis* NCTC 7944 and *S.haemolyticus* NCTC 1042 which showed minimal growth at 0.3125%. The Gram negatives, however, were more resistant to the effects of the propolis with only *S.typhimurium* NCTC 74 and *P. aeruginosa* NCTC 10331 being inhibited at 5%. All the other bacteria within the group exhibited full growth.

The same experiments were carried out on the neem extract but no positive results were obtained. However, like the aged garlic, all the research that has been done previously has involved freshly extracted neem and not commercially produced extracts, and this may again have some bearing on the effectiveness of the product.

The opportunity to carry out this research was most enjoyable and benefited me greatly, allowing me not only to use and master equipment and techniques that I may not have otherwise encountered, but also to observe the actual process being performed in industry.

Katie Murcott
Manchester Metropolitan University

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Epidemiological Typing of Coagulase-Negative Staphylococci

COAGULASE-NEGATIVE staphylococci (CoNS) are the most common aetiological agents implicated in nosocomial bloodstream infections in many hospitals (Coello *et al.*, 2003). The increase of nosocomial bacteraemia caused by CoNS is unfortunately concurrent with advances in modern clinical practice including the use of indwelling medical devices and a rise in the number of immunocompromised patients.

The association of CoNS with various infections and their species diversity has been elucidated by the development of improved methods for their identification and characterisation. Accurate identification and typing of microorganisms is also crucial when undertaking epidemiological investigations. Indeed, strain typing methods are becoming widely applied in the clinical setting in order to; investigate outbreaks of infection, detect cross transmission of microorganisms, determine the source of a microorganism, recognise virulent strains and monitor vaccination programmes (Olive and Bean, 1999).

A number of typing techniques have been employed to investigate isolates of CoNS. Until recently, most of these techniques have been based on characterisation according to the expression of phenotypic traits. Such techniques include; biotyping, bacteriophage typing and antibiotic sensitivity patterns (antibiograms), however in general they poorly discriminate strains within an individual species. The discriminatory power of antibiogram typing of nosocomial strains of CoNS is thought to be particularly inadequate due to the fact that such an environment acts as a reservoir for antibiotic resistance genes.

The introduction of genotypic typing methods such as plasmid analysis, DNA hybridization, polymerase chain reaction (PCR)-based typing and pulsed-field gel electrophoresis (PFGE) has improved the characterisation and discrimination of CoNS. This is because analysis of genetic material is not influenced by environmental factors unlike phenotypic techniques which are dependant on gene expression. Characterisation and confirmation of the identity of CoNS recovered from clinical specimens in the hospital routine microbiology laboratory is commonly based only on Gram-stain, coagulase test, biochemical profiles and antibiogram. Indeed the microbiological diagnosis of catheter-related bloodstream (CR-BSI) infection is often determined by the recovery of the same species of microorganism with an identical antibiogram from the catheter tip and blood cultures obtained from patients with suspected infection (O'Grady *et al.*, 2002). The poor discriminatory power of antibiogram typing could therefore result in an over-estimate of the rate of CR-BSI.

This is supported by a recent study conducted by our research group at the University Hospital Birmingham NHS Trust. Coagulase-negative staphylococci were isolated from catheter tips and blood cultures from patients with suspected CR-BSI. These strains appeared identical by antibiogram and therefore the results were indicative of CR-BSI. However, using PFGE they were shown to be distinct strains of CoNS supporting the conclusion that diagnoses of CR-BSI were less likely (Casey *et al.*, 2003).

Many cultures of CoNS obtained from patient specimens are considered by the routine microbiology laboratory to contain just one strain as there commonly is no variation in colonial morphology following overnight incubation. Consequently, identification of CoNS and antibiotic sensitivity testing is undertaken usually on a single or limited number of colonies from cultures. During our studies, multiple colonies from a seemingly pure culture plate were genotyped using PFGE and this demonstrated that several genotypes were present within single cultures and subsequently, cases of CR-BSI may be misdiagnosed if single colonies are selected at random (Casey *et al.*, 2003).

Indeed, it has been demonstrated that a 24 hr incubation period is inadequate to observe differences in colony morphology in CoNS cultures. Instead it has been suggested that following 72 hr incubation, clear differences in colonial morphology can be observed (Kloos and Bannerman, 1994). However, we must question whether we have the time for

extended incubations and the time consuming use of PFGE.

Although PFGE is one of the most discriminatory and reproducible typing methods available to genotype CoNS and is often regarded as the gold standard, efforts to reduce the time required to perform this technique have been unsuccessful and the process remains relatively time-consuming (Chang and Chui, 1998). Therefore it is unlikely that this expensive, time-consuming genotypic technique will be incorporated routinely into the clinical microbiology laboratory to aid the diagnosis of specific infections such as CR-BSI. This technique is likely to be used in epidemiological investigations in the serious outbreak situation. However, with the time-consuming nature of PFGE, epidemiological results are often of retrospective value.

In recent years there has been an insurgence of studies evaluating rapid PCR techniques for typing microorganisms such as CoNS. Indeed, the genotypic characterisation method based on the random amplification of polymorphic DNA (RAPD) has been used to genotype CoNS with relative success in the clinical setting as well as the food production industry.

However the DNA extraction process is often complicated and time consuming. Furthermore, the discriminatory power of RAPD has previously been questioned and even the use of multiple primers in the analysis of clonal microorganisms may provide only a limited improvement in discrimination. It would seem that the level of discriminatory power depends heavily on the sequence of the primers employed (Hopkins and Hilton, 2001).

We recently evaluated a rapid RAPD protocol developed by colleagues at Aston University for the typing of CoNS isolates recovered from bone marrow transplant patients with CR-BSI. The method comprised of a simple and rapid DNA extraction process and a relatively short set of PCR cycles. The RAPD technique described in the presentation achieved a discriminative power comparable with PFGE. In addition, our evaluation concluded that this technique may provide the potential to genotype strains of CoNS with high reproduceability within just 4 hours, thus providing the microbiologist with valuable epidemiological information, for example in an outbreak situation (Casey *et al.*, 2005).

I would like to express my gratitude to SFAM for the President's Fund Grant which allowed me to attend and present a poster at the 15th European Congress of Clinical Microbiology and Infectious Diseases in Copenhagen, Denmark.

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Anna Casey

Multiple drug resistance in enterobacteria from food animals and humans

MULTIPLE DRUG RESISTANCE in enterobacteria from food animals and humans is a major concern for human health. In Europe, multidrug-resistant (MDR) strains of *Salmonella enterica serovar Typhimurium* have caused outbreaks of infection since the early 1990s, while *S. Newport* has recently been spreading on an epidemic scale throughout the United States.

International trade enables such MDR strains to become widely distributed. In England and Wales, all enterobacterial isolates from cases of human infection submitted to the Health Protection Agency Laboratory of Enteric Pathogens are tested for resistance to a panel of antimicrobials. Identification of specific resistance genes, or mutations conferring resistance to an antimicrobial ('resistance gene profiling') has also been of considerable importance in numerous outbreaks and is central to identifying existing and newly emerging resistance mechanisms against therapeutic drugs. Much of the data presented here results from a Department of Environment, Food and Rural Affairs (Defra) project aimed at developing and validating screening methods for detection of potential new and emerging hazards relating to antimicrobial resistant organisms in the food chain. In order to assess the current presence of organisms/genes of concern in England and Wales, the project aims to screen a large collection of *Salmonella* and *Escherichia coli* clinical isolates for mechanisms of antimicrobial resistance that could lead to failure of therapy with first-line drugs.

Fluoroquinolones are broad-spectrum antimicrobials effective in treating a wide variety of clinical and veterinary infections, particularly when the organism involved is invasive. Before the early 1990s, resistance to fluoroquinolones was rarely found in clinical isolates of *E. coli*. Since then the number of isolates showing clinical resistance (MIC ≥ 2mg/L) has increased significantly worldwide. High-level resistance in salmonellae in the UK is relatively uncommon and is often associated with strains acquired through foreign travel. Resistance usually arises spontaneously due to point mutations in the topoisomerase genes gyrA, gyrB, parC and parE. Numerous methods for the detection of single nucleotide polymorphisms (SNPs) based on real-time PCR using mutation-specific probes, PCR-restriction fragment length polymorphism (RFLP), mismatch amplification mutation assay (MAMA) PCR using mutation-specific primers and denaturing high-performance liquid chromatography (DHPLC) have been described. In an outbreak of MDR *S. Typhimurium* DT104 exhibiting decreased susceptibility to ciprofloxacin, identification of the mutation(s) in gyrA was of critical importance in demonstrating the clonality of the outbreak strain (Walker *et al.*, 2000). However, no single current method can be used alone for detection of novel mutations, therefore sequencing of the gyrA amplicon remains the gold standard.

As part of this project, we have been developing a pyrosequencing assay to detect and identify the most frequently occurring SNPs within gyrA and parC of *Salmonella enterica* (see Figure 1). Pyrosequencing is a 'sequencing by synthesis' technology suitable for the rapid detection of SNPs

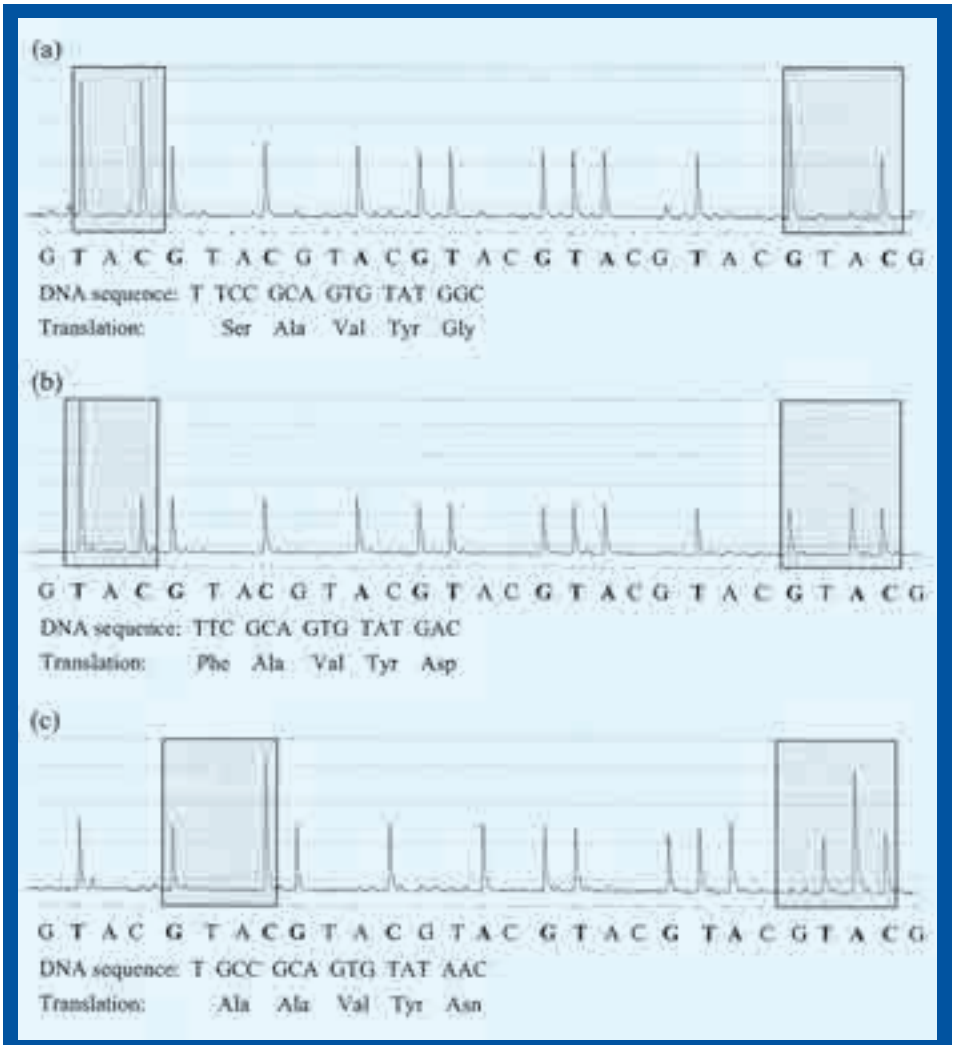


Figure 1: *Detection by pyrosequencing of mutations in gyrA of S. enterica. During Pyrosequencing the four nucleotides are added sequentially to the reaction. Incorporation of a nucleotide complementary to the template results in a release of light that is detected and presented as a peak on the Pyrogram. The amount of light released is proportional to the number of nucleotides added. (a) mutation Asp87Gly, (b) mutation Ser83Phe and (c) double mutation Ser83Ala and Asp87Asn. The shaded boxed regions highlight the polymorphisms.*

(http://www.pyrosequencing.com). It does not rely on mutation-specific primers, probes or enzymes, therefore novel mutations can be identified in a rapid and cost-effective manner without requiring further investigation by sequencing. Molecular techniques enabling screening of large numbers of fluoroquinolone-resistant isolates for mutations in the topoisomerase genes are being developed and consequently new mutations are regularly being identified.

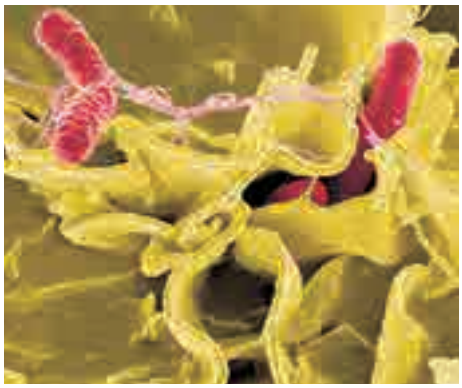
However, the role of these mutations has not been fully elucidated. Further work is required to determine the identity and frequency of point mutations that have the largest effect on fluoroquinolone MIC and to investigate the effect of different fluoroquinolones on the development of mutations. These mutations could then be incorporated as the targets in new screening methods.

The development of resistance to ß-lactams in a variety of zoonotic pathogens is of particular concern because of their extensive therapeutic use. Acquisition of ß-lactamases is the predominant cause of resistance in Gram-negative bacteria and poses potential treatment problems by limiting available options. The development of resistance to ceftriaxone is of particular concern. Plasmid-encoded AmpC and CTX-M ß-lactamases have been discovered worldwide; both are rapidly growing groups of enzymes that have been associated with nosocomial infections and outbreaks.

There are currently more than 20 plasmid-encoded AmpC genes identified, while at least 40 CTX-M genes have been described that can be divided into five phylogenetic groups based on amino acid sequence identity.
(see: www.lahey.org/studies/webt.asp).

In the USA, strains of *S. Newport* with plasmid-mediated resistance to extended spectrum ß-lactams (ESBLs), in addition to other commonly used antimicrobials, have caused numerous outbreaks in cattle and humans (Zhao *et al.*, 2003). Resistance of *S. enterica* to ESBLs is rare in England and Wales but appears to be increasing in incidence, and there is major concern that MDR S. Newport may eventually appear in food production animals and humans in Europe.

A combination of phenotypic and multiplex PCR genotypic screening of *S. enterica* and *E. coli* clinical isolates for the presence of plasmid-encoded AmpC ß-lactamases found AmpC-mediated resistance in *Salmonella* in the UK was rare, and in most cases the isolates originated from patients reporting recent travel abroad. However, some infections acquired within the UK were also associated with AmpC producers (Batchelor *et al.*, 2005b). This screen also identified the first incidence of blaDHA-1 in the UK (Liebana *et al.*, 2004). Similarly, CTX-M genes were identified for the first time in *Salmonella* from infections acquired abroad and within the UK (Batchelor *et al.*, 2005a). The screen of *E. coli* isolates identified a new CTX-M gene, designated CTX-M-40, which was identified in an isolate of *E. coli* from a UK hospital patient (Hopkins, unpublished observation). The most common AmpC type identified in UK E. coli was CMY-7, previously only identified in *E. coli* from Punjab, India (Child *et al.*, unpublished observation, GenBank Accession Number: AJ011291).



S. typhimurium, (in red) invading human cells in culture

To date there have been very few surveys on the prevalence of CTX-M genes in the UK and no reports on the prevalence of plasmid-mediated AmpC resistance. Those genes that we identified for the first time or have previously been identified infrequently may therefore be more prevalent than thought. This underlines how resistance gene profiling is central in identifying existing and newly emerging resistance mechanisms against therapeutic drugs and demonstrates how surveillance of resistance mechanisms is important for the control of antimicrobial resistance.

Further work is being carried out to investigate the plasmid environments in which these genes are inserted. In particular, a replicon typing method based on five multiplex and three simplex PCR assays is being used to identify the resistance plasmid incompatibility group (Carattoli *et al.*, 2005). This technique will be useful in monitoring the circulation of plasmids within strains from different environments and to follow the horizontal transmission of antimicrobial resistance genes among Enterobacteriaceae.

I would like to thank the Society for Applied Microbiology for awarding me a President's Fund grant, which enabled me to attend the 7th International Meeting on Microbial Epidemiological Markers in Victoria, British Columbia, Canada to present my abstract as oral and poster presentations. This work was funded by Defra project VM02136.

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Katie Hopkins

Carbohydrate Active Enzymes of Streptococcus pyogenes

GROUP A STREPTOCOCCI (GAS) are infective human pathogens capable of causing a wide range of clinical manifestation such as scarlet fever, pharyngitis, rheumatic fever, streptococcal toxic shock syndrome (STSS) and severe invasive infections such as necrotizing fasciitis.

Streptococci produce a range of virulence factors associated with their infectiveness including pyrogenic exotoxins involved in the systemic toxicity of the bacteria, a hyaluronate capsule which allows for evasion of the host defences and surface M proteins which are a major component in the adhesion of the bacteria during infection (Medina, 2004). The surface M proteins also form the basis for the classification of GAS. The M protein classifications are identified by a numbering system. M1, M3 and M18 GAS are of particular importance due to their relative abundance in human infections.

- M1 are commonly seen in invasive infections and have been seen to be responsible for GAS epidemics
- M3 are the prevalent cause of STSS and necrotizing fasciitis
- M18 has been seen to be found in persistent sequelae such as rheumatic fever

Streptococcus pyogenes is a Group A *Streptococcus*. The strain SF370 is an M1 *Streptococcus* and as such is capable of causing invasive infections and has been seen to be one of the primary causes of GAS epidemics (Banks *et al.*, 2002). In streptococcal species there is a high degree of genetic variation which contributes to the diversification and evolution of the species. Phage or phage-like elements cause the majority of this variation. The bacteria are polylysogenic, containing material from multiple phages, GAS M1 serotype contain four such elements which accounts for 7% of the total genome and encodes 172 coding sequences (Banks *et al.*, 2002). These coding sequences often encode for enzymes that have been acquired by the streptococcus through evolution and have an implication in their ability to infect. It is this polylysogeny that causes such a wide degree of variation among streptococci from the same M group.

Bacteriophages use tail fibre proteins to bind to host receptors during an infection. An example of such viral fibre structures is the triple beta helix. The triple beta helix is a left handed turn with a triangular cross section. As the name suggests each turn is composed of three strands which are connected by short linkers with hydrogen bonds across the strands. The strands cause angles of approximately 60^{o} between them. The structure has a central longitudinal hydrophobic core. The highly twisted structure means that 57% of the accessible surface of the monomer is buried when in the trimer. This structure has been shown to form the puncturing needle of the phage. Such fibre proteins have been shown to be enzymatically active and this is the case of HylP1 from *S. pyogenes* looked at in this study. Like hyaluronan degrading enzymes from streptococcal species, such enzymes from bacteriophages are believed to be involved in adhesion and invasion. Hyaluronidases from bacteriophage are believed to be involved in the degradation of the hyaluronan capsule allowing for infection of streptococcus (Baker *et al.*, 2002). Carbohydrates have great structural and functional diversity in nature. From this ubiquity it is apparent that there must be a plethora of enzymes involved in the biosynthesis, catalysis and utilization of carbohydrates. This vast diversity of such enzymes has led to the development of a classification database called CAZy (Carbohydrate Active enZymes). This database classes carbohydrate active enzymes based on their activity or putative activity, into 5 groups: glycosidase and transglycosidases, glycosyltransferases, polysaccharide lyases, carbohydrate esterases and carbohydrate binding modules. The classes are further split into families which contain proteins with a degree of sequence similarities.

Polysaccharide lyases catalyse the cleavage of the beta 1-4 glycosidic bond via a beta elimination mechanism causing the formation of an unsaturated carbon-carbon double bond at the non-reducing end of the saccharide. Glycoside hydrolases also cleave the glycosidic bond between disaccharides but by the use of activated water. There are two mechanisms of action which result in either the retention or the inversion of the anomeric structure. This study looks at such carbohydrate active enzymes from *S. pyogenes*. Three phage encoded genes, *HylP1*, *HylP2* and *HylP3*, from *S. pyogenes* have been cloned and expressed using cloning vectors and recombinant technology. *HylP1* has been characterised as a polysaccharide lyase against hyaluronan from umbilical cord and the structure solved using x-ray crystallography showing the characteristic structure of the tail fibre of the bacteriophage containing a unique triple beta helix at its core. *HylP2* and *HylP3* have been cloned and expressed but are yet to be characterised.

A further enzyme from *S. pyogenes* is encoded by the gene *Ugl*. The encoded enzyme is thought to be from a unique class of enzymes, the unsaturated glucuronyl hydrolases. These fall into the class of glycoside hydrolases but are unique in that they will only target unsaturated residues from polysaccharide lyase degradation removing this residue and allowing for further degradation (Hashimoto *et al.*, 1999). *Ugl* has been cloned and expressed and has shown some activity against unsaturated hyaluronan produced using *HylP1*.

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Anna Marie Lindsay

The real Cuba

CUBA IS NOT ALL IT MAY SEEM at first sight. To those who read selectively, it is a communist dictatorship caught up in the indoctrinations of past regimes. It is portrayed as a very poor country where average earnings are $10 a month and transport consists of a mix of aged old American cars and Ladas way past their sell bye date. Equally, it is visited by thousands of western holidaymakers as part of the all-inclusive scene where sun worshipers are hustled from the airport to resorts such as Varadero to be cocooned in 4 star beach hotels where sun, sea and the expected trappings are provided.

For those who are more open minded and who venture beyond the walls of their package world, the real Cuba is waiting to be discovered. For those who don't they are captives to the blinkered views of the popular press and may as well have gone to the Costa Brava for their sun and sangria.

Sure, the people are poor in monetory terms and the young Cuban's who are not old enough to remember even harder times, may grow tired of Castro and his style of dictatorial leadership and their restricted opportunities and difficult lifestyles. However, while Castro has not removed poverty from the lives of most everyday Cuban's we should not loose sight of what he has achieved. Within a year of securing the freedom of his people he had taken steps to address illiteracy and ensure all Cuban's were given the opportunity to read and write.

Today all education from junior school to University is free to Cubans. Virtually every state has its own university. There is also free health care for all Cubans and some of the medical centres, treatment waiting times and equipment available would put our own health care system to shame. Dozens of new institutes have been opened. While it is true some are very basic and impoverished, others are state of the art. The Cuban government have seen fit to invest heavily in medical research in particular and this is exemplified by the leading institutes who produce vaccines for the world market. The first meningococcal vaccine against *Neisseria menengititis* B was, and still is, produced in Cuba. Currently they are developing further new and/or improved vaccines. At the Finlay Institute and other centres in Havana the only synthetic vaccine against *H.influenzae* is under development, as are vaccines to tackle *N.meningititis C, Salmonella typhi* and leptospiras. Research is ongoing with vaccines to be used against Dengue, Hepatitis A and C, HIV and Chaga's disease.

In July of this year I attended the 14th International Scientific congress in Havana with the help of the President's Fund. Plain to see, was the depth and volume of Cuban research in a variety of fields. Sessions covered the latest research on topics as varied as the use of plant extracts to treat disease to the latest advances in nuclear medicine.

One particular talk which caught my eye was give by a British speaker, Julian Holmes, who now lives in South Africa. He is a dentist and contributed a paper on the use of ozone in dentistry. In a remarkable talk he opened my eyes (as well as my mouth) to the revolution which is about to transform dental treatment. Fewer drillings, fillings, straining to see blurred X-rays are just around the corner if Julian is to be believed. Ozone research was prominent not just in the dental field but in its application in a range of medical fields to treat a range of infections and other bacterial diseases. Indeed, the Cuban's have an institute dedicated to the study of ozone therapies.

While this short article does not seek to diminish the still considerable hardships in the lives of many Cuban's and to excuse some of the dictatorial practises still enforced, these shortcomings should not be allowed to detract from the many pluses which Cuban science and society have to offer. They are a warm and friendly people and their contribution to both has been, and will continue to be, immensely significant.

Peter Green

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Transgenic Plants – Current innovations and future trends.

C. Neal Stewart (Ed) with 24 contributors. Horizon Scientific Press UK. 2003. Pp. 297
ISBN 1 898486 44 1
Reviewed by: Eric Bridson

This reviewer's interest in transgenic plants began when shown the immense opportunities of plant-based vaccines. This multi-contributor book covers many other aspects of plant transgenisis for further applications. There are three nuts-and-bolts chapters in the book on how to make transgenic plants. The editor has covered as wide a field as is possible to attract non-specialist readers. Each chapter is self-contained.

Gene transfer is a rapid mode of introducing desirable characteristics into plants. For example: herbicide tolerance and insect resistance in cotton, maize and soya bean crops. Such crops are grown widely in the USA and Canada. Genetically modified crops are not currently welcomed in Europe. It is, of course, perfectly reasonable to measure the effects of genetic modification of crops in the local eco-systems of European farming. It is not reasonable to say that all GM crops are harmful, unless this can be proved. An outstanding good example is 'Golden rice.' These vitamin A/iron enriched rice grains could much improve the diets of millions of people who depend on rice as their major staple food. It is unfortunate that arguments on the merits of GM foods often involve commercial aspects of the subject. Does the modified seed remain the property of the large corporations producing GM plants? What would be the cost implications for farmers in poor countries? This editor, very wisely, has avoided discussion about this aspect of transgenic plants.

A major concern with GM crops is the use of antibiotic-resistant genes to act as markers in the process of transfer. The presence of such a-r genes in GM crops has become a political and regulatory problem. The European Union, in the Directive 2001/18/EC has banned the use of a-r genes being used in commercial transgenic plants that could

pose a risk to human and animal health. Whilst the risk of horizontal movement from plants to microbes is low, it is obviously wise to seek less contentious methods to mark transgenisis. The safety of transgenic foods is fully discussed in chapter nine. Here the contributors point out that 'safe' does not mean without risk. There is a level of risk in eating any food! Risk assessments for GM foods are largely carried out on animals. The potential for producing allergenicity is more significant. Food allergies occur in about 2% of adults and 4-8% of children. The vast majority of allergens occur in a small group of foods: cow's milk, wheat, tree- and peanuts, eggs, soya beans, fish and crustaceans. It is possible to assess the potential allergenicity of GM foods by measuring the binding of IgE in sensitized serum taken from allergic individuals.

Chapter 10 'Plant-based vaccines' was particularly interesting. By 2050, the population of this planet could reach 10 billion. The expansion of international travel and immigration, greater dependence on global food production and general loss of isolation by previously remote populations, could increase the risk of rapid transmission of infectious diseases. There is little possibility that antibiotics or parental immunization will have much impact on the global dissemination of these diseases. The current common method of immunization, using traditional injectable vaccines, has two major disadvantages:

i. the method of vaccine preparation is costly, requiring highly skilled staff working in high value sterile premises with continuous refrigeration necessary to store the vaccine.

ii. The humoral immune response from parental injection fails to generate significant levels of mucosal immunity.

It is the mucosal immune responses in gastro-intestinal, respiratory and uro-genital tracts, which form the first line of defence against invasion by most infectious diseases. The secretory antibodies formed (sIgA) can survive on mucosal surfaces and can prevent adherence of infectious organisms. It follows, therefore, that plant-based vaccines could show huge advantages over the existing small scale injectable system that is currently available. It should be the vaccine of choice for pandemic bird-flu.

The greater part of this book is readable by general microbiologists, the very specialized aspects can be passed over. Most readers will be both wiser and much better informed about transgenisis and GM food crops, by the time they reach the last page of this very interesting publication.

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Tuberculosis and the Tubercle Bacillus

Eds: S T Cole, K D Eisenach, D N McMurray, W R Jacobs
ASM Press. Washington. 2005
ISBN 1-55581-295-3 pp. 584
Reviewed by: Eric Bridson

This substantial book is divided into eleven sections:
1. Historical perspectives of tuberculosis.
2. Clinical and epidemiological perspectives.
3. Diagnostic tests both immune-based and molecular methods.
4. Multi-drug resistance and the mechanism of resistance.
5. Genomics.
6. Genetics.
7. Cell structure, in particular the waxy outer coat.
8. Metabolism of the organism.
9. & 10. Host-pathogen interactions, antigenic variation and responses.
11. Use of animal models and the development of tuberculosis vaccines.

The opening pages describe how the USA crisis in the early 1990s, catapulted tuberculosis back into centre stage of international health concerns. Although there had been a steadily increasing rate of infection from 1984, it was the institutional outbreaks of multi-drug resistant (MDR-TB) strains in Miami and New York, with very high fatality rates, that set alarm bells ringing across the USA. Implementation of DOTS (directly observed treatment, short course) controlled the epidemic but at great cost. By 2001, 155 countries across the world had adopted the DOTS strategy. Tuberculosis is the second most common infectious cause of adult mortality. The association of HIV-TB causes the highest fatalities. Although sub-Saharan Africa is often cited as the centre of the current explosion of case numbers, India and China have 1.5-2.0 million new TB cases each year.

The contributors make clear that the standard laboratory diagnostic steps to identify active tuberculosis are far too slow. Much faster tests to identify the disease and measure drug susceptibility are required. New antigens to provide sensitive and specific skin tests are being sought. Molecular testing to detect *M. tuberculosis* in clinical specimens are being developed. Coping with the spread of MDR-TB is a major target but so far it only operates in prosperous countries. Genomic analysis of the tubercle bacillus is fully discussed, together with its role in developing diagnostic tests, novel drug targets and new vaccines. The genome sequence of *M. bovis* BCG Pasteur will lead to more effective and safer vaccines. The cell envelope of mycobacteria is a particular challenge. If the thick, waxy coat can be made more permeable, a host of inhibitory compounds could be used to destroy this organism. There is also extensive information on mycobacterial metabolism and biochemical pathways.

This book is an absolute mine of current information on all aspects of *M. tuberculosis*. Its 37 chapters contain over 3,500 references with 13 coloured plates plus many diagrams and tables. The editors have ensured that the 92 contributing authors avoided duplication or contradiction. It will be a major reference source for many years to come.

High pressure processing

The opportunities afforded by high pressure sterilisation in food production and new product development are the subject of a new review from CCFRA. High pressure sterilisation: a review first outlines the role that novel technologies, including high pressure processing, can play in product and process innovation, before examining in detail the use of high pressure in product sterilisation.

It explains several different approaches to high pressure inactivation of bacterial spores, as well as describing the product quality benefits that can be achieved with high pressure sterilisation. It also discusses various aspects of the process such as compression heating effects, minimising heat loss and process validation, and briefly outlines the economics of the process.

Although high pressure processing was first developed many years ago, it is now that the full benefits of the approach are being realised and exploited. This review was produced as a part of a wider range of activities undertaken at CCFRA in the area of high pressure processing.

Air quality standards in food production areas

Air is a potential source of food contaminants, but help is at hand to minimize the risk of contamination via this route. A new edition of CCFRA's well-established Guidelines on air quality standards for the food industry provides extensive practical guidance for food and construction companies on the installation, monitoring and maintenance of air quality systems to help prevent food contamination and assure product safety

Devised by experts drawn from the food, air handling and research communities, the new edition spans the complete air handling chain from identifying the design and type of system most appropriate to particular food production operations through construction and validation to maintenance, cleaning, monitoring and assessing environmental impact.

The guide is one of a series to help technical personnel in the food and construction industries with hygienic aspects of building or refurbishment of food production facilities. The other titles in the series are: Guidelines for the hygienic design, construction and layout of food processing factories; Guidelines for the design and construction of floors for food production areas (second edition); and Guidelines on the design and construction of walls, ceilings and services for food production areas (second edition).

Further Information

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For more information about the Society, Society meetings, the benefits of membership, *Microbiologist*, or to join us please visit the Society website at www sfam.org.uk

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www.sfam.org.uk

The website is the best source of detailed information on the Society and it's many activities. It has a lively discussion forum and fully interactive membership areas where you can book your place at Society meetings find and advertise jobs, display your CV and much more.

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membership options

- **Full membership** gives online access to the ***Journal of Applied Microbiology***, ***Letters in Applied Microbiology*** and ***Environmental Microbiology***, copies of ***Microbiologist***, preferential registration rates at Society meetings and access to the members areas of the website.
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- **Honorary Membership** of the Society is by election only and this honour is conferred on persons of distinction in the field of applied microbiology.
- **Corporate membership** is open to all companies with an interest in microbiology. Corporate members benefits include:

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- Full page advertisement in the Members' Handbook.
- 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).

Meetings

We hold two annual meetings. The January Meeting comprises discussion sessions with the opportunity to display posters on related work. 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.

Publications

The Society publishes two monthly journals: ***Journal of Applied Microbiology*** and ***Letters in Applied Microbiology.*** We also produce our own quarterly in-house colour magazine: ***Microbiologist***, which contains features, reports topical news stories and full details of our meetings. The Society is also a partner with Blackwell Publishing in the bi-monthly journal ***Environmental Microbiology.***

Online journals

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 three journals: ***Journal of Applied Microbiology***, ***Letters in Applied Microbiology*** and ***Environmental Microbiology***. 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.

Grants & awards

Many 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 easy-to-use online application forms.

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