Microbiologist

The magazine of the Society for Applied Microbiology ■ March 2004 ■ Vol 5 No 1 ISSN 1479-2699

The good, the bad and the ugly

Clostridium botulinum neurotoxins

ALSO IN THIS ISSUE:

- Bioterrorism
- Design-a-bug competition winners
- Immunomagnetic separation
- Book now for the 2004 Summer conference in Cork!

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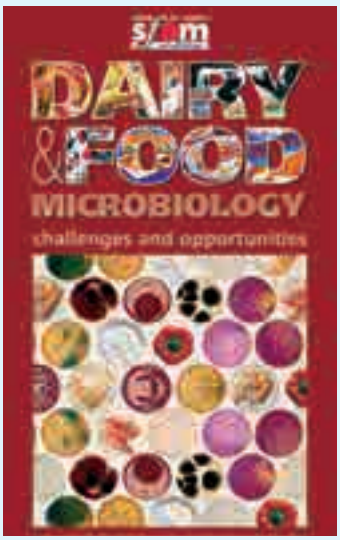
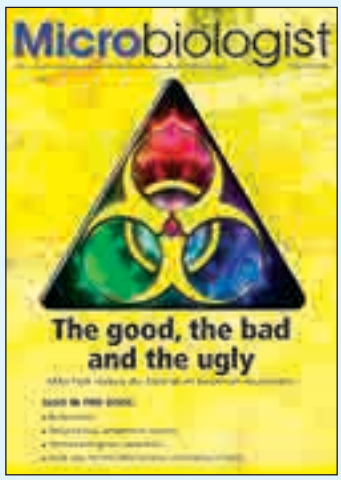


The editor is always looking for enthusiastic writers who wish to contribute articles to *Microbiologist* on their chosen microbiological subject. Email: a.c.hilton@aston.ac.uk

FEATURES



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www.sfam.org.uk

Invisible world

FOR MICROBIOLOGISTS, familiar with the world invisible to the naked eye, there can be little more gratifying than witnessing the expression on a lay-person's face when they observe microorganisms for the first time; whether peering down a microscope or viewing an electron micrograph as part of a presentation their wonderment is obvious. This reaction has become increasingly apparent to me during University open days when students and their parents have the opportunity to see what higher education and life at university is all about. During the sessions on microbiology I look to the assembled company for their reaction when I show micrographs of various microorganisms, and sure enough their expressions betray their amazement.

I mused over this phenomenon for some time as it suggests that until that epiphany they had accepted, almost without question, that this 'invisible' world existed. Maybe we just live in a society where scientific 'faith' is widely accepted, or, potentially more likely, we just don't bother to think about or question issues that are not immediately obvious to us? It makes me wonder how Antony van Leeuwenhoek was received by the lay-people of 1683 when word first got out of his writings to the Royal Society about observations on the plaque between his teeth, *"a little white matter, which is as thick as if 'twere batter."* Leeuwenhoek reported, *"I then most always saw, with great wonder, that in the said matter there were many very little living animalcules, very prettily a-moving."* I imagine many at the time thought him mad and few, if any, blindly accepted his remarkable observations.

Leeuwenhoek's window on this invisible world was a simple microscope that he skilfully crafted with a small lens in a brass mount. Microscopes have obviously developed somewhat since then, however they still remain largely the

privilege of the few. (Having said that, I have seen 'microscopes' for sale in a local children's toy store for only £10.99! I've no idea if they work but they have to be at least as powerful as Leeuwenhoek's microscopes that offered 150 x magnification at best!). The recent SfAM design-a-bug competition was a wonderful insight into the minds of young children who have obviously heard of microorganisms but almost certainly never seen them. We had such a large response from a few schools, obviously committed to communicating microbiology, that the Society has responded by providing these enthusiastic teachers with the 'window' their students need to nurture their interest in microbiology. The only downside is sadly, in the years to come, the amazement on people's faces may not be so readily revealed when they observe microorganisms but let's hope it is just because they've seen it all before.

society for applied sfam microbiology

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WATCH OUT FOR OUR FULL FEATURE IN THE JUNE ISSUE!

Design-a-bug Competition

Winning entries:

Under four years

Joint winners: George Davies-Potter, Emma Bennett, Sophie Fooks, Maya Ordway

Five to eight years

Winner: Merryn Isabel Post

Nine to twelve years

Joint winners:
Mashal Iftikhar,
Sheffield High School, Sheffield
Aidan Bain, Wallace Hall Academy

The **design-a-bug** competition launched in the September 2003 issue of *Microbiologist* really captured the attention of young budding microbiologists. Entries in three age categories attracted over 180 submissions, with nine schools getting entire classes involved; one school submitted entries from fifty children in one class! The entries were wonderfully imaginative and consequently very difficult to whittle down to the winning submissions in each category.

Committee determined a short-list of entries and these were exhibited during the lunch and poster sessions at the January meeting in Newcastle. Delegates were invited to vote for their favourite by placing a sticker next to the drawing which were later counted to determine the 1st, 2nd and 3rd place winners.

Winners will receive a superb Crayola dawing set. All entrants receive a certificate, SfAM bug, pen and pencil-case. In recognition of the school entries each school will receive a microscope and set of prepared slides showing various bacteria to nurture their interest in microbiology. These will be officially presented to the schools during special events planned over the next few weeks, and will feature in *Microbiologist* in June. Thank you and congratulations to everyone who took part.

Archaea Word Search Quiz Answers

Z	X	S	D	Z	S	A	O	K	E	W	V	I	J	S	F	Y	E	V	O	G	P	R	V	C	J	Y	S	P	S
U	K	O	U	A	T	X	W	R	A	B	Z	Q	G	J	U	I	O	G	V	M	W	F	K	L	B	U	T	I	X
Z	P	X	K	V	A	D	I	H	Z	M	F	H	I	N	U	B	M	X	J	G	I	A	N	S	L	S	W	C	C
S	O	C	H	T	P	U	F	Q	Y	X	E	H	O	M	I	H	O	J	E	K	L	K	Y	I	W	S	I	R	H
Z	F	H	I	Z	H	T	K	V	D	R	H	X	M	D	Y	O	F	L	U	T	Q	X	H	T	U	R	O	O	F
T	J	I	V	G	Y	C	L	E	G	E	F	V	Y	K	I	Z	C	I	O	X	G	P	K	C	R	D	X	P	J
C	J	A	W	F	L	G	W	E	F	T	X	L	F	A	Z	N	W	O	I	R	O	J	C	G	D	M	I	H	N
G	S	G	Z	Z	O	F	X	T	Y	C	Q	S	D	I	N	Q	Z	Y	C	L	Y	O	O	Y	W	G	A	I	N
E	D	A	X	S	T	K	O	N	Q	A	P	M	Q	E	U	V	U	Q	A	C	C	P	B	J	M	Y	J	L	D
G	S	D	W	K	H	G	P	J	G	B	E	A	Y	G	S	C	K	H	H	O	U	A	S	B	J	D	Q	U	Z
V	G	Z	X	J	E	V	Z	G	Q	I	M	V	F	K	E	U	O	F	M	X	K	S	Q	O	B	U	K	S	X
H	M	H	J	R	R	J	Q	O	N	V	S	E	L	A	Q	N	L	R	Z	Z	N	C	B	O	S	D	L	L	G
D	V	H	W	E	M	B	L	X	S	E	R	M	C	Z	A	X	E	F	F	G	L	R	P	C	G	N	L	X	H
N	Q	Z	K	K	U	J	W	T	L	R	S	D	U	H	A	H	W	P	U	T	I	O	F	D	Q	J	W	B	C
K	U	K	E	J	S	U	C	D	O	B	J	T	T	R	T	G	S	V	H	R	D	S	Y	I	X	J	E	R	H
D	Z	E	H	W	Q	N	K	G	M	O	N	E	E	H	B	T	H	E	R	M	O	P	L	A	S	M	A	C	S
K	S	P	M	P	O	F	L	N	Z	N	M	X	A	T	Y	U	R	S	B	S	U	C	R	O	Q	W	V	S	U
H	B	S	U	C	C	O	C	O	N	A	H	T	E	M	T	M	R	Y	V	S	V	E	O	Y	F	O	K	U	N
Z	Z	Z	H	G	B	U	A	C	G	H	K	L	I	H	O	E	H	O	X	X	F	D	O	C	D	G	X	B	A
A	S	R	I	U	S	S	T	I	K	T	V	C	M	S	O	T	R	M	N	O	E	L	T	Z	C	Q	N	O	I
K	O	D	S	U	V	Q	K	T	B	E	R	E	P	O	K	U	T	I	L	O	N	M	P	G	K	U	D	L	D
N	A	T	R	I	A	L	B	A	H	M	P	H	J	I	I	R	Y	A	A	Q	R	S	R	M	O	O	S	G	I
U	O	I	O	C	B	A	E	O	X	S	A	R	T	V	A	Q	H	A	K	A	T	T	X	N	X	P	U	O	C
T	S	Z	Q	J	K	I	N	J	Z	E	K	K	S	M	Z	D	J	K	L	J	A	B	A	H	H	F	V	E	A
G	X	B	J	R	U	F	T	D	R	S	P	J	G	M	D	I	R	T	E	X	G	J	O	N	L	T	R	A	M
M	M	H	I	Y	I	E	T	A	X	B	O	E	F	U	R	H	T	T	G	C	Q	K	S	Y	W	O	A	H	Z
C	Z	L	T	V	D	F	B	O	F	G	E	O	K	R	H	M	I	B	X	Q	Y	D	A	G	L	Y	C	C	Z
O	S	M	W	D	Q	B	H	U	K	D	I	C	P	L	G	O	I	D	W	U	S	E	K	N	S	V	W	R	J
W	L	W	X	U	J	H	D	R	Y	Y	H	J	S	U	B	O	L	O	I	G	Y	T	S	W	O	H	T	A	D
S	U	L	F	O	P	H	O	B	O	C	O	C	C	U	S	Q	C	X	K	T	Z	N	Q	U	Y	A	Q	X	O

I personally thought the **Archaea word search quiz** in the December *Microbiologist* was really difficult, and that was when I knew the names of the bugs to look for! I was therefore very impressed to receive so many correct entries with a strong representation from our international membership. The winning entry was submitted by **Kevin Charman** of Surrey who correctly searched out all 20 Archaea. Well done, a £30 book token is on its way to you!

This time see if you can unscramble the hidden phrase. The numbers give a big clue to get you started and I've thrown in a 'V' for good measure. Get your entries in to the Society office by 16th April to have the chance of winning a £30 book token.

DO YOU HAVE A QUIZ FOR US?

If anyone has a quiz that we could use in *Microbiologist* please get in touch with the Society Office – I'm rapidly running out of ideas to keep you challenged. (Ed).

Archaea Word Search Quiz Answers

Acidianus, *Archaeoglobus*, *Desulfurococcus*, *Ferroglobus*, *Haloferax*, *Igniococcus*, *Methanobrevibacter*, *Methanococcus*, *Methanohalophilus*, *Natrialba*, *Natronorubrum*, *Picrophilus*, *Pyrolobus*, *Staphylothermus*, *Stetteria*, *Stygiolobus*, *Sulfophobococcus*, *Thermococcus*, *Thermoplasma*, *Thermosphaera*

Code Breaker Quiz

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
																					L				

_ _ _ _ _
H M T O M

V _ _
L H M

_ _ _ _ _ _ _ _ _ _ _
R J J X Q J M F O J D

_ _ _
Q H Z

_ _ _
T F J

_ _ _ _ _
K A V Z T

_ _
T O

_ _ _
Z J J

_ _ _
H M I

_ _ _ _ _ _ _ _
I J Z G V A S J

_ _ _ _ _ _ _ _
S H G T J V A H

_ _
A M

1674

A £30 book token is waiting for the person whose entry is drawn from the editor's lab-coat pocket first! The closing date for entries is **Friday 16 April 2004**. The answers will appear in the June 2004 issue of ***Microbiologist***.

Name: ______________________________

Address: ______________________________

Simply photocopy this page and send it to: 'Microbiologist Code Breaker Quiz', Society for Applied Microbiology, The Blore Tower, The Harpur Centre, Bedford MK40 1TQ, UK. **Remember, you could win a £30 Book Token!**

New Members

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

Australia

Professor H J Fallowfield; Dr N J Rogers; Dr D A Veal

Brazil

Dr B Stambuk

Cayman Islands

Ms A Johnson

Ethiopia

Dr J Search

France

Mr A Blackwell; Professor P Lebaron

Hong Kong

Professor P-K Wong

India

Dr P Dargan; Mr S Pai

Iran

Mrs S T Dalir; Dr M R Soudi

Italy

Dr G Spano

Japan

Dr C A Asis; Mr K Shima

Mexico

Dr R Cruz Camarillo

United Kingdom

Mrs C C Anyanwu; Mr B Bahrami; Mr I Bamforth; Miss A Brown; Miss K E Brown; Miss R Buck; Mrs O Chymera; Mr N Clarke; Mr L Cosgrove; Mr L Darkwah; Miss K Duangmal; Mr J I Elzwai; Ms J Evans; Mr D Ferrett; Dr P Fuchs; Miss T Gallagher; Mrs C E Gallagher; Miss R Guppy; Miss M E Hope; Miss G Hughes; Mrs H F Joliffe; Ms T J Karpanen; Dr M A Kertesz; Dr Z Khodaii; Dr E Komitopoulou; Dr A J Lawson; Dr D McCleery; Miss G Moore; Mr S More; Mr C N Pandya; Mr W Pathom-Aree; Mr T Puehmeier; Dr E Rappocciolo; Miss J Rollason; Miss A K Rowan; Mrs N J Senior; Miss R L Smith; Dr J P Taylor; Ms D Vicente; Dr A M Webster; Mr P Wheat

USA

Dr F Balaa; Mr D Robbins

UK Corporate

Campden & Chorleywood Food Research Association

School Associate Members

St Edmund's School, Canterbury, Kent; The Leys School, Cambridge; Sacred Heart Grammar School, Newry, Co. Down.

Dr Peter Silley asks who are SfAM, reviews the recent changes that have been made to the Society's grants and awards and highlights some exciting new awards

In the last eighteen months official SfAM duties have brought me into contact with many people with whom I would not normally meet. In such cases the question has often been asked, "and just who are SfAM?" This has been a theme very much on the mind of Committee over recent months. We recently spent time with Professor Nigel Poole, considering that very question.

We are the voice of Applied Microbiology and if we do little else we must begin to project key messages to our colleagues, to politicians and to the public. Over the coming year you will be hearing much more about these key issues which are summarised below;

Applied Microbiology is pivotal to solving the challenges we face in the health, food and environmental sectors; SfAM is the voice of Applied Microbiology.

SfAM recognises that in the UK there are skill deficiencies in Applied Microbiology. SfAM will contribute to identifying and implementing solutions.

Applied Microbiology is essential to the maintenance of our quality of life, for example public health. SfAM will work with others to raise public understanding, appreciation and application of microbiology to everyday life.

Development and exploitation of Applied Microbiology requires the maintenance and improvement of the microbiological resources in the UK, such as culture collections and other specialised facilities. SfAM will work with others to identify the needs and solutions.

These issues will continue to be highlighted as continue the task of promoting applied microbiology.

I also want to focus on some of the changes that have recently been made to existing SfAM awards and highlight some new awards that have been introduced, for the benefit of all members. You may find this difficult to believe, but we continually have trouble in giving away money. Each year money is set aside by Committee to support the various awards that are on offer to you, the members, yet at the end of the year we have always had money left in the pot. In an attempt to rectify this situation we have had a radical overhaul of the Awards. As the voice of Applied Microbiology it is imperative that we are adequately resourcing our members. This is one of the ways in which we can work together to enhance your professional development.

So just what are these awards? At the top of the list is the **W H Pierce Memorial Prize** (see page 14). This prestigious award is presented each year at the annual Summer Conference to a young microbiologist (under 40!) who has made a substantial contribution to the science. The award was instituted in 1984 by the directors of Oxoid to commemorate the life and works of the late W H (Bill) Pierce, former chief bacteriologist of Oxo Ltd and a long-time member of the Society. The closing date for applications is 6 June each year, so if you wish your nominee to be considered for this prize at this year's Summer Conference please submit your application well before June. We are indebted to the ongoing support of Oxoid and I would personally like to thank Mike Smith the Oxoid CEO for his support of the Society not only through this prize but in so many other ways.

The President's Fund is perhaps the most widely used prize and we have just increased the maximum grant available from £500 to £1000. In order to improve access we have reduced the period between applications from 3 to 2 years and providing you have been a member for at least a full subscription year before the event to be attended and are a fully paid up member you are eligible. The Fund was established to provide funding to members to assist them to attend scientific meetings or workshops related to their area of work. The money allotted to the Fund is approved by Committee on an annual basis and all awards are made at the sole discretion of the Honorary President. Another change to the Fund is rather than ask recipients to provide a written report of the meeting they

attended we will in future be asking you to write for *Microbiologist*. If you therefore accept a **President's Fund** award you are also agreeing to produce an article for *Microbiologist*, the content of which will be agreed with our editor, Anthony Hilton (For more information see page 43).

The **Students into Work** scheme has been very successful in recent years. Again we have increased the money available by raising the weekly pay to £160 per week and also allowing up to £500 to be paid for consumables used by the student. The scheme offers full members the opportunity to give undergraduate students studying microbiology as part of their degree programme, or those who have recently graduated, the chance to obtain work experience. Grants can be made available to any full member who is able to offer a suitable work placement for a period of up to 10 weeks, any time during the year. 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 a grant. The placement can last for up to a maximum of 10 weeks. Applications should be made by the supervisor using the "Student into Work" application form on the website. Successful applicants and their students/ graduates must write a report on the placement. This will usually be published in *Microbiologist*. Normally a member may not apply for a further grant until a period of two years has elapsed. 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.

The **Sponsored Lecture Grant** is another award which has benefited from increasing the value from £150 to £500. This allows groups, clubs and societies with an interest in microbiology to invite notable speakers to give guest lectures. The increase in this award will now allow invitations to eminent overseas speakers to be made and clearly reflects the position of SfAM as the voice of applied microbiology within the UK.

Two newly instigated awards are the **Endangered Culture Collection Fund** and the **Overseas Development Award**.

Culture collections throughout the world help preserve and maintain the working tools of our trade as practising microbiologists. In many countries these precious biological resources are becoming endangered and are being lost to the scientific community. Working with the World Federation of Culture Collections (WFCC), the Society has taken the initiative and inaugurated the SfAM **Endangered Culture Collection Fund.** This new fund is intended to allow UK collection staff to visit endangered collections and provide training and advice aimed at preserving culture collections either in situ or within the country of origin as well as to provide short term relief and pay for the relocation of collections to a willing recipient where collections cannot be maintained in situ. A grant of up to £2500 is available for these purposes. Application is only open to Full members of the Society. Annual awards totalling £2500 will be considered. This may be a single award or multiple smaller awards. In exceptional circumstances this amount may be exceeded. Applicants must have been members of the Society for at least 3 years or have their application sponsored by such a member. Applicants can apply online or by requesting an application form from the Society Office. All applications should also be supported by a formal letter on headed paper from the appropriate institution and must be countersigned by a senior officer representing that organisation and supporting the application. Applications are considered on a year round basis and should in the first instance be addressed to the Hon. General Secretary at the Society Office. A condition of funding is that a report must be produced for publication in *Microbiologist*.

The new **Overseas Development Award** is intended to assist Society members in developing countries and Eastern Europe to visit laboratories and give lectures and training in appropriate areas of applied microbiology, or support overseas members to visit UK laboratories to receive training in appropriate areas of microbiology or to support technology transfer in applied microbiology for which sources of funding do not exist. Nominations for awards will normally be considered by the Society's Awards panel in March, July and November each year. Individual awards up to a maximum of £5000 will be considered. The laboratory supporter must be full member of the Society and have held membership for at least 3 years. Detailed information must be provided about the relevance of the application and the available local support. A condition of funding is that an appropriate report must be written for publication in *Microbiologist* magazine together with photographs where possible.

The **Conference Studentship** Grant probably needs no introduction. The Society offers studentships to enable student members to attend Society meetings. These grants cover registration, accommodation and meals (where appropriate) and reasonable travel expenses. Preference is given to those contributing to the meeting either by offering a paper or poster and who have not previously received a studentship.

These grants and awards offer tremendous opportunities to all members whether you work in private industry or the public sector. It is of concern to me that so few of our industrial members apply for SfAM grants. The funds are available to all.

Not only is SfAM looking to invest within the science community, but the UK Chancellor, Gordon Brown has also said that a long-term plan for science funding will be a key component of Britain's spending review of 2004.The Chancellor has said that the government aimed "to make Britain the best location for research and development and for innovation". This is something it already encourages, he said, by spending £1.25 billion annually renewing Britain's science base, offering tax credits for research and development, and other measures.

In January he told the Advancing Enterprise Conference of Government's commitment to make a long-term plan for science funding over the next decade a central feature of the 2004 spending review. Despite the pressure on government to keep public spending in check, Gordon Brown has acknowledged that science is one of Britain's strengths in a global market and should be encouraged, *"It is precisely these British qualities — our global reach, our scientific genius, and now our stability — that are vital assets for winning in a more harshly competitive global economy"*.

We will watch these plans develop with great interest!

Further information

You can find detailed information on all the Society's grants and awards on the Society website at:
http:/www.sfam.org.uk/members/prizes.php

Peter Silley

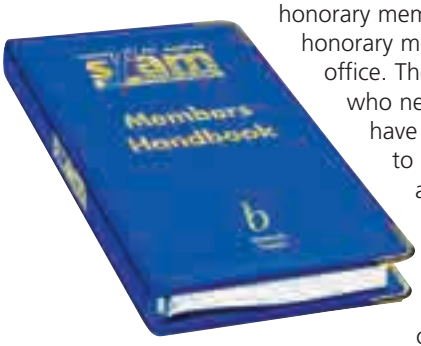
Your Society needs YOU!

SfAM is the voice for Applied Microbiology and often gets requests by journalists for background briefings or information. Are you interested in being part of a small group which will brief the media about applied microbiology? If so please contact **Nigel Poole** in Public Affairs at the Society Office. Phone 01344 750248 or email him at: **Sekona@btopenworld.com**

Call for nominations to Committee

Dr Valerie Edwards-Jones became the New Honorary Treasurer in January 2004. This caused an incidental vacancy and Committee invited Dr Geoff Hanlon, who stood for election last year, to fill the vacancy until the new elections in July 2004. In addition, 3 other members of Committee are due to retire in July 2004 after their 3 years of service: Dr Hilary Dodson, Professor Peter Gilbert and Dr Peter Green. Thus, there will be 4 vacancies to fill in July 2004. Nominations are invited from all full members of the Society for these vacancies. Nominations must be made in writing and received at the Society Office by 17th May 2004. Should nominations exceed vacancies, election will be by a system of postal voting arranged by Committee.

Call for Honorary Members



The Society is looking to receive nominations for the award of honorary membership of SfAM. Currently all ex-presidents have honorary membership conferred at the end of their period of office. The Society is seeking to expand this to individuals who need not necessarily be a member of SfAM but who have made a significant and acknowledged contribution to applied microbiology either in the UK or overseas and/or to the Society for Applied Microbiology. There will at any time be a maximum of 20 Honorary Members plus all past Presidents. Nominations can be made by anyone and should be submitted to the President via the Society office. The President will call a meeting with two Past Presidents who together will consider the nominations and submit a recommendation for committee approval.

School Associate Membership

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!

Sponsor a new Member and win a £50 Book Token!

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

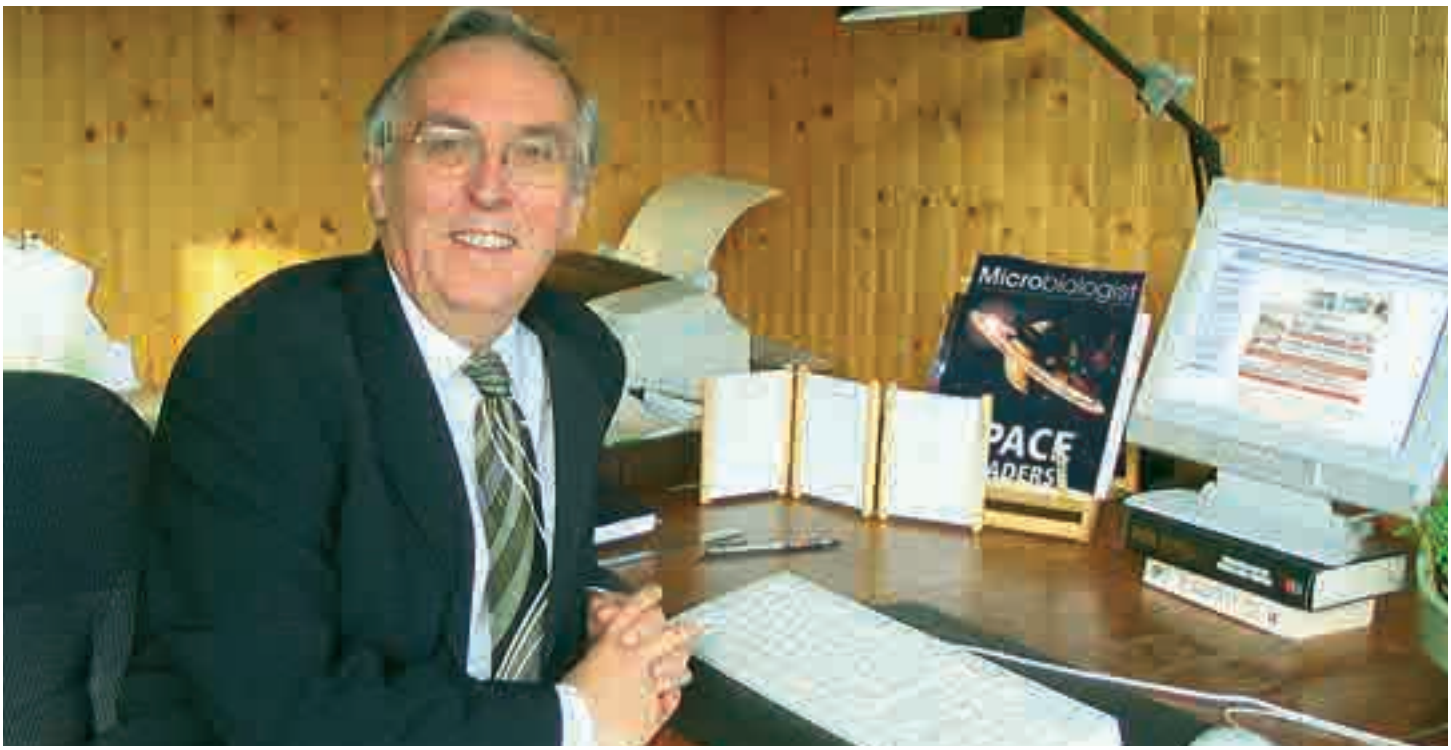
If you feel you could be our next winner for 2004, and would like some promotional material to help you recruit new members please contact Julie Wright, Membership Co-ordinator on 01234 326661 or email julie@sfam.org.uk.

Sponsor of the Year Award

Would you believe it, the winner of the 2003 sponsor a new member is our very own *Microbiologist* editor, Anthony Hilton, for the second year running! Only narrowly taking the lead from a closely following pack. Congratulations and thank you on behalf of the Society for your continued effort in recruiting new members.
If you think you could be our next winner for 2004 and would like some promotional material please contact the Society office.

Julie Wright
Membership Co-ordinator

New Public Affairs Executive



In January the Society appointed a public affairs executive in the form of Sekona Partnerships. Half of the team is our ex-treasurer Geraldine Schofield who many of you will be already familiar with, accompanied by Professor Nigel Poole.

Professor Poole was one of the founder members of the Department of Microbiology at Aberdeen University in the early seventies. He joined ICI/Zeneca in 1976 and ended up as the Group Manager for External and Regulatory Affairs at Zeneca Plant Science. He was awarded on OBE for services to the biotechnology industry in 1999 and was recognised by the UK chemical industry with the award for the "most outstanding contribution to advancing the public understanding of science". He holds honorary Professorships at the Universities of Aberdeen and John Liverpool John Moores.

In 2000 Nigel founded Sekona Partnerships which works with organisations to build relationships with their stakeholders (government, media, other companies) in complex, and often controversial areas.

"Public Affairs at SfAM is a very exciting task. Every day there are stories in the media with a microbiological theme. SfAM is the voice for Applied Microbiology and I will be ensuring that Government, academia, industry and the media hear and understand the importance of Applied Microbiology. One of my first tasks will be to form a group of SfAM members who are willing to give background briefings to the media."

Professor Poole can be contacted on **01344 750248** or by email at: **Sekona@btopenworld.com**

London Marathon Sponsorship help

Hello Microbiologists
My partner, Ross Bridgeford, is running the London Marathon this year and is currently trying to raise as much sponsorship money as possible for the **Anthony Nolan Trust,** a bone marrow register. This follows the support they gave to a close friend, Heather, and her four-year old daughter Bethany, who sadly passed away late last year. The Trust receive no Government or Lottery funding and are therefore reliant upon donations.

To find out more about Ross and his running visit www.sponsorrosstorun.co.uk or email runningross@hotmail.com to pledge your donation! Every penny counts and if you are willing to donate £1 per mile you can guess his finishing time and enter a £50 sweepstake (straight from his own pocket)!
Get donating!

Anouche Newman
Editorial Assistant

In Memoriam: Professor E O Morris

PROFESSOR ERNEST OLIVER MORRIS, who died on 28th October 2003 joined the Society in 1959. Ernie, as he was known to colleagues and friends, became a lecturer in the biological sciences section of the School of Pharmacy at the Royal College of Science and Technology in Glasgow, soon to become the University of Strathclyde in 1964. Ernie's career had not been a simple progression through academia. Born in Birmingham, he left school at fourteen to train as a laboratory technician at the Queen Elizabeth Hospital. When war broke out in 1939, as a member of the Territorial Army, he served in the RAMC in France and his unit was one of the last to be evacuated from Dunkirk. Prior to leaving for France in 1939 he had married Iris, a Welsh nurse he met at the Queen Elizabeth Hospital. They had two children, Jane born in 1942 in Wales and Michael born in 1949 in Birmingham. Later he was posted to the Far East where he served in India and Burma. This gave him a life-long interest in the culture of these areas and a particular interest in students from there while they studied in his department.

After his wartime experiences, Ernie decided that he was capable of directing work as had his officers in the army and he applied to study at Birmingham University under the accelerated scheme for war veterans. In two years he emerged with an honours degree in Malting, Brewing and Industrial Fermentation. This was followed by a PhD at the School of Dentistry on the oral microbiology of children. About 1952 he moved to the Brewing Research Foundation at Nutfield in Surrey where he worked under Professor Sir Ian Heilbron .

During the period at Nutfield his work involved studying cultivated yeasts used in the brewing industry and he discovered that, unlike wild yeasts which cause problems in the industry, cultivated yeasts could not utilise lysine as a sole source of nitrogen. This led to the formation of the Morris and Eddy medium for the detection of wild yeasts.

Ernie left Nutfield in 1956 to become a lecturer at the Royal College of Science and Technology in Glasgow. It was a time of great change in the higher education system and the college became the University of Strathclyde in June 1964. The Department of Pharmacy had until then included a biological section, which came into its own with the formation of the Department of Applied Microbiology and Biology. This included microbiology, food science biochemistry and biology and Ernest Morris was appointed Professor of Applied Microbiology and Biology. In 1966 a separate Professor of Biology was appointed and Ernie became the Professor of Applied Microbiology.

Under his guidance the department's research work expanded. He formed a Yeast Technology Group to investigate yeast genetics and biochemistry. There was a strong inclination to the teaching of food microbiology, research into industrial fermentation in several fields

and aquatic and marine microbiology. Novel techniques for the cultivation of marine yeasts came from this work. From 1973-75 Professor Morris was the President of the Society for Applied Microbiology. He was also awarded an FRSE for his contribution to science. Ernie retired in 1980 aged sixty-seven. A kind, generous man with a truly avuncular interest in his staff and students he was keen to encourage people to make the best of themselves and actively helped people with technical qualifications to complete degrees at Strathclyde. There was an arrangement with Bell College of Technology whereby students studying to become technicians could transfer to the Strathclyde degree course if suitably competent.

Ernie had many interests. As a young man he had been a successful swimmer and narrowly missed a place in the Olympic team, played water polo and was a fine singer. When he left the army he decided on a university course rather than following a career as a professional singer. In later years he sang in amateur operatic societies and could be counted upon to sing selections from Gilbert and Sullivan at Departmental parties and Final Year dinners. From his father he had acquired a love of woodworking and marquetry was one of his hobbies.

When he took up his appointment at Strathclyde, he and Iris lived in Craigendorran where Iris looked after Ernie's father as well as bringing up the family. After retirement he looked forward to relaxing and enjoying his family of whom he was extremely proud. Unfortunately, Iris developed a chronic and progressive illness and Ernie devoted himself to looking after her for ten years. Iris had been a mainstay of family life and a "mother" to the fledgling Department of Applied Microbiology.

After Iris's death in 1990, Ernest lived independently until 2002 when increasing frailty forced him to move into residential care. That year he was made an Honorary Member of the Society. He died on 28 October 2003. A kindly man, cheerful and with a "hands on" approach to microbiology, Ernie will be remembered with deep affection by former colleagues and students. He is survived by his daughter Jane, son Michael and their children.

A lifetime of Achievement

At the Laboratory News Industry Awards in November **Don Whitley** received a lifetime achievement award

A LONG TIME MEMBER OF SfAM, Don Whitley joined the Society in 1968 and marked his retirement from Don Whitley Scientific in 1994 with the establishment of a generous Society Travel Scholarship. Don was also the official Society photographer for many years and hosted the annual photography competition at the Summer Conference. This award recognises his significant and continued contribution to microbiology.

Born in London in 1929, the elder son of a fitter with J Lyons and Co, Don, along with his family, escaped the war torn capital when the decentralisation of tea packing meant relocation to Leeds. Don was educated at Morley Grammar School, where he fostered an ambition to study medicine. His parents, however, were of the opinion that being a doctor was 'not for the likes of us', and he was dissuaded from taking such a career path.

On leaving school he became an assistant in the textile research department at Leeds University; a job that he hated. It was here that he avidly read copies of *The Lancet* and would see advertisements for Medical Laboratory Assistants. Don wrote to twenty-two Leeds hospitals and nursing homes in the hopes of finding such a position. As luck would have it, the matron at The Women's Hospital in Leeds passed his letter on to their laboratory who were looking for a trainee technician.

It was here that Don gained his Intermediate and Associateship in Microbiology and achieved his Fellowship in Haematology. He was the Secretary of the West Yorkshire Branch of Biomedical Sciences for many years. Don was eventually made Chief MLSO at Killingbeck Hospital when it was a T B Sanatorium and then returned as Chief to the Leeds Maternity Hospital. During all these years, Don battled to overcome a severe stammer, which, at times left him almost incapable of coherent speech.

Don decided that he wanted to leave the Health Service and begin a career in the commercial world. He applied for a total of eighteen jobs as a medical representative, but his severe speech impediment did nothing to help him convince the interview panels that he was the man for the job; indeed, he was openly laughed at in some interviews.

It was after one such interview, that, by way of consolation, he treated himself to fish & chips, wrapped in the time honoured way in newspaper. As he screwed up the paper he saw an advert for a Sales Representative for Oxoid Limited. He duly sent off his application and was called for interview. So sure was he that his interview would go the way of all the others that he relaxed, and did not stammer. He sold himself so well that he got the job! That was in 1956.

*Don Whitley receives his lifetime achievement award from **Alexandra Bailey**, editor of **Laboratory News***

Don worked very successfully in this role, building up business Yorkshire, Lincolnshire, Nottinghamshire and Leicestershire, while at the same time building strong scientific and personal relationships with many post graduate students at Leeds University Medical School, including Dr Geoff Hobbs, Dr Trevor Willis, Dr Peter Walker, Dr Max Sussman and Dr John Norris — to name but a few who went on to great achievement in the field of microbiology.

Due to family ties, Don eschewed offers of promotion, which meant moving away from the North, but he eventually took up a position with Becton Dickinson, promoting and selling BBL culture media. He left them after eighteen months to join the Bydand Group of companies, becoming the Sales Manager of R B Turner Ltd, then moving on to become Technical Manager of Stayne Veterinary Ltd where he helped develop a commercial kit for the screening of cattle for Brucellosis with the Rose Bengal Antigen. He eventually became Technical Director of the RB Turner Glass Division in Bishop Auckland who were producing blood collection tubes etc. Shortly after this appointment the Bydand Group sold out to Becton Dickinson, and Don left the company.

During his time in the Health Service, Don had formed an allegiance with John Trowbridge, Microbiologist at the Royal Berkshire. Don took John with him, first to Becton Dickinson and then to the Bydand Group, culminating in John being Sales Manager for R B Turner when Don was Sales Director. Once the company had been bought by Becton Dickinson, Don and John decided to set up in business together. Their joint venture, LIP Services, was set up in Don's house in Shipley. The company sold Lab M culture media and plastic disposables. After three years in this alliance, Don felt that his

ambition lay in designing new products and he sold his 25% share to John for £5,000 and, with this money, Don Whitley Scientific Limited was born.

Don designed a new anaerobic jar using Schrader® valves. These were incorporated into the Oxoid jar which won a design award and is still manufactured today. These new jars swept the market, allowing the tiny company to expand and be recognised in a highly competitive field. Don also designed a Hydrogen Generating System that was taken up and developed by Oxoid. This was closely followed by a carbon dioxide generating kit for growing microaerophillic bacteria such as *Campylobacter* spp and a low temperature palladium catalyst, still used today in anaerobic jars.

In the late 1970s Don designed an anaerobic cabinet, the Mark 1, that revolutionised how laboratories isolated anaerobic bacteria. It had fewer leaks due to the construction, less condensation due to the external desiccant system and more catalyst allowing a lower oxygen concentration. Don Whitley Scientific quickly became a leading player in the UK market, with the workstations being continuously developed through the Mark 2, WISE, Mark 3 and Compact models.

In 1993, DWS launched its own Whitley Automatic Spiral Plater (WASP) onto the market. This is now a market leader and a winner of a Millennium Product Award. It was Don who suggested the principles of Gravimetric Diluting whilst in a bar on the Florida Keys with Sam Schalkowsky. Spiral Systems went on to produce the first model and now a number of models exist

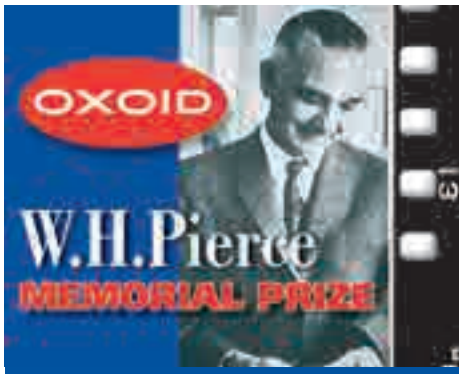
Don was involved with the early commercial development of the Malthus impedance system produced by Torry Research in 1977. As Don Whitley Scientific grew, it became possible for Don to look at producing his own system. Launched in 1987, Rapid Automated Bacterial Impedance Technique (RABIT) soon became a strong player in the market and is still an important product for the company both in the UK and overseas.

Paul Walton, Don's eldest son sums up his father's achievements... *"There cannot be many microbiologists in the world who have not used something in which Don has had a hand."*

Evan Kitsell
Don Whitley Scientific Limited

W H Pierce Prize Winner

The winner of the 2003 W H Pearce Memorial Prize was **Dr Jean-Yves Maillard** of the University of Brighton, who presented the following lecture at the SfAM January Meeting in Newcastle.



Do you know a young microbiologist (under 40 years of age) who has made a substantial contribution to microbiology? If so, why not nominate them for this prestigious and substantial award which is worth £2,000. The award was instituted in 1984 by Oxoid to commemorate the life and works of the late W H (Bill) pierce, former chief bacteriologist at Oxoid Ltd and a long-time member of the Society. The prize is presented annually at the summer conference. Full Members wishing to make a nomination for the 2004 prize should write in confidence to the Hon General Secretary, Margaret Patterson, at the Society Office in Bedford, including a full cv of the person nominated and a letter of support. Please note there are no official forms for this award.

Closing date for nominations is 5th June 2004.

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

I STUDY BIOCIDES. Biocides are chemical agents with a preservative, disinfectant or antiseptic property. They have been used for centuries principally as preservative agents for water and foodstuffs, for wound dressings and later as disinfectants with the development of antiseptic surgery in the 19th century. Since then the number and diversity of biocides available commercially has escalated tremendously and this reflects the increase in usage of these compounds in the hospital environment and in various industries. More recently, public awareness of microbial contamination and hygiene control has driven an increase in biocide usage in the home environment.

This increase has led to some serious concerns; notably over the emergence of bacterial resistance and a possible cross-resistance to other antimicrobial compounds, including antibiotics. These issues were debated by the Royal Pharmaceutical Society and recommendations were made to a subcommittee of the Lords select committee on science and technology (1997). It has become clear that although the antimicrobial efficacy of biocidal formulations used for a wide range of applications is generally well documented, our understanding of their mechanism(s) of action, and of microbial resistance to these agents, is comparatively limited. This also clearly shows the marked difference with the field of antibiotics, the mechanisms of action of which are much better understood. This disparity of knowledge reflects the significant emphasis on antibiotic research given by the pharmaceutical industry and work commissioned by governments and other

organisations such as the World Health Organisation. Despite an extensive knowledge of antibiotics, the number of microorganisms presenting a multiple resistance profile to these antimicrobials (the so-called 'superbugs') is increasing. This observation is particularly pertinent given the release of recent figures by the European Antimicrobial Resistance Surveillance System (EARSS), which describes the emergence of "superbugs" as being *'alarmingly high in the UK'*. My work has been strongly stimulated by the general lack of information on biocides and the urgent need to understand better the emergence of resistance to antimicrobials. Among all microorganisms, the activity of biocides against viruses has been the least studied (with the possible exception of prions, the agents responsible for transmissible degenerative encephalopathy). In a series of papers I have demonstrated that different types of biocides interact in a distinct manner with viral agents and caused well-defined damage. It was interesting to observe that most biocides had no effect on the viral nucleic acid, which was protected within the capsid even though they acted principally on that viral capsid. It was later seen that some viruses (certain bacteriophages and enteroviruses) could also adapt to low concentrations of biocides, although the exact mechanism of adaptation has not been elucidated to date.

Although my work has initially been driven by the paucity of information on biocide interaction with viruses, I rapidly became involved in the study of other microorganisms. Understanding biocide interactions from this wider perspective has become a feature of my research and has provided further intellectual challenges to answer two fundamental questions: how do biocides interact with cells and how might microbial resistance to biocides emerge?

It has always been accepted that biocides have several target sites within the bacterial cell, and this characteristic distinguishes them from antibiotics. Although, this concept is certainly true for highly reactive biocides, such as alkylating and oxidizing agents, others, such as cationic compounds, dyes and phenolics are less reactive, and might have a selected number of primary interaction sites with the bacterial cell. This idea of primary target site(s) for these biocides, brings the mode of action of these agents closer to that of antibiotics and creates 'novel' concepts in terms of emerging bacterial resistance to disinfectants and, particularly, bacterial cross-resistance with antibiotics. This *'primary target site for biocides'* concept has now been fully acknowledged by scientists during an international conference on biocides that I organised in 2001. This has lead to some serious questions about the extensive and, sometimes, improper usage of biocides.

For the past few years, these questions have been paramount in my thinking and have laid the basis for exciting new investigations. These are represented by a series of research studies on bacterial resistance and on the role of cell-to-cell communication in response to sub-inhibitory concentrations of biocides, which constitutes a new approach.

It has become clear that bacteria are extremely efficient in reducing the concentration of biocide that might be harmful to them. I strongly support the idea that the main mechanism of bacterial insusceptibility to biocides is their ability to restrict the uptake of these agents, mainly through the influence of their outer cell wall structures. Other scientists have proposed the role of promiscuous efflux systems as a key determinant of bacterial resistance to biocides and other antimicrobial agents. Indeed, the involvement of some efflux pumps in bacterial resistance to biocides and other agents has been recently highlighted as an important mechanism for achieving cross-resistance with antibiotics. My own view is that efflux pumps combined with degradative enzymes are playing an important role in antimicrobial resistance, but only when the overall concentration of a biocide is below a 'lethal' threshold. Under these circumstances, of course, the microorganism is able to select optimal mutations to maintain a resistance profile.

My colleagues and I observed that it was possible to isolate highly resistant microorganisms to a particular biocide '*in situ*' and to train bacteria to become increasingly resistant to a biocide in the laboratory.

These investigations have shown that, although cross-resistance was observed on occasions, there was no systematic correlation. This re-emphasised the need to study in more depth biocide-bacteria interactions. Furthermore, we have observed that bacteria showing a significant increase in minimum inhibitory concentration to a biocide are still sensitive to a high-concentration of that agent. Even though these findings might reassure health professionals and the industry somewhat, the increased usage of products containing a low concentration of a biocide and/or possessing a 'residual activity' needs to be scrutinised in more detail. Further, when combined with a trend to overlook factors that affect activity, the need to study the effect of low concentrations of biocides on the microbial cells is obvious. This area of research has become increasingly important even though industrial interests still exceed health authority interests. Although my work has been driven by the intellectual challenge of biocide interactions with microorganisms, it has also generated significant collaborations with, and benefits to, the pharmaceutical industry. The development of a 'novel' testing protocol is a direct response to industrial needs. This *'ex-vivo'* test will provide professionals with an important tool for the safe and thorough testing of the antimicrobial efficacy of antiseptics. This test will benefit the public and health professional by ensuring that (i) antiseptic products meet their label claim and (ii) antiseptics are able to eliminate pathogenic microorganisms present on the skin.

The field of biocides is under researched. I have endeavoured to communicate my enthusiasm for the interaction of biocides with bacteria to undergraduate pharmacy students with the elaboration of comprehensive research projects. I have also aimed to enhance the understanding of those microbial cell structures that are responsible for a lack of antimicrobial activity, as demonstrated by my continuous collaboration with medicinal chemists. Furthermore, my involvement with SfAM has provide me with a vehicle to develop industry and health professional awareness about biocide issues. Finally, I am in debt to Professor A D Russell, who has been my research mentor for many years. He has helped sustain my interest in this exciting field and our collaboration has evolved from his original supervision of my PhD work, to a fruitful and constructive exchange of ideas, which have been exemplified by the many research publications and grants we have jointly obtained.

Jean-Yves Maillard
University of Brighton

CPD ACCREDITATION

A total of **23 credits** have been awarded to this conference, broken down as follows:
Monday 12 July: **1 credit.**
Tuesday 13 July: **8 credits.**
Wednesday 14 July: **10 credits.**
Thursday 15 July: **4 credits**

DAIRY & FOOD MICROBIOLOGY

challenges and opportunities

sfam SUMMER CONFERENCE ● CORK, IRELAND 12-15 July 2004

This is the first time that the Society has visited the Republic of Ireland for its Summer Conference. It is fitting that the topic of dairy and food microbiology has been selected for this meeting since it is one of the main interests of our members, the agri-food industry is such an important one in the region and University College, Cork has an outstanding reputation for teaching and research in the relevant microbiology.

The programme addresses challenges in relation to animal and human disease but also opportunities presented by developments in food biotechnology, novel processes and products.

One session will be devoted to offered papers on any aspect of applied microbiology and posters will be available for viewing throughout the meeting.

Conference overview

This programme was up to date at the time of publication but may be subject to change. For the very latest information and an online booking form please visit: www.sfam.org.uk/sumconf.html

Monday 12 July 2004

14.00 onwards	Arrival of delegates
18.45 – 19.45	Dinner in Devere Hall, University College Cork (UCC)
20.00 – 21.00	Brains Trust in Students Union, UCC
21.00 onwards	Society Mixer in bar adjacent to Devere Hall, UCC

Tuesday 13 July 2004

07.30 – 08.30	Breakfast
09.00 – 10.45	**Session 1: Animal Health and Zoonoses**
10.45 – 11.15	Coffee and poster session
11.15 – 13.00	**Session 1 continued**
13.00 – 14.00	Lunch
14.00 – 15.45	**Session 2: Food Biotechnology**
15.45 – 16.15	Tea and poster session
16.15 – 17.25	**Session 2 continued**
18.30 – 19.30	**Trade Reception**
19.30	Depart for Old Middleton Distillery "Irish Night"
20.00	Dinner and Entertainment

Wednesday 14 July 2004

07.30 – 08.30	Breakfast
09.00 – 10.45	**Session 3: Human Health**
10.45 – 11.15	Coffee and poster session
11.15 – 12.25	**Session 3 continued**
12.25 – 13.30	Lunch
13.30 – 15.00	**Session 4: Offered papers (student)**
15.00 – 15.30	Tea and poster session
15.30 – 17.30	**Session 4: Offered papers (non student)**
17.30 - 18.00	W H Pierce Prize Winner
18.00 - 18.30	sfam Annual General Meeting
19.15	Coaches depart for UCC
19.30 – 20.00	Reception at UCC
20.00	Society Dinner at UCC

Thursday 15 July 2004

07.30 – 08.30	Breakfast
09.00 – 10.45	**Session 5: Novel Processes and Products**
10.45 – 11.15	Coffee and poster session
11.15 – 13.00	Session 5 continued
13.00	Lunch and close

Please note that ALL scientific sessions, breakfast, coffee, lunch and afternoon tea are located in Jury's Hotel and in Session 4, offered papers on ANY microbiology topic are welcome. You can now submit your abstracts via the Society website.

Online abstract submission

If you want to submit a paper for this meeting on any topic in microbiology you can now do so by using our **online submission process**. Please visit sfam.org.uk/sumconf.html and scroll down the page until to you find 'CALL FOR OFFERED PAPERS'. Then simply click the 'online form' link to submit your abstract. Alternatively, you can contact the Society Office who will post an abstract submission form to you. **Deadline for all submissions is 30 April 2004**

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

DAIRY & FOOD

Programme

Monday 12 July 2004

20.00–21.00 **Brains Trust**
Chair: Dr Pat Wall, University College, Dublin, Ireland
Panel: Prof Tim Cogan (Teagasc, Fermoy, Ireland); Prof Kevin Collins (UCC, Ireland); Prof David McConnell (Trinity College, Dublin, Ireland); Prof Fergus Shanahan (UCC, Ireland)

Tuesday 13 July 2004

Session 1. Animal Health and Zoonoses

Chair: Dr P Silley (SfAM Hon President)

09.00–09.35 **Treating mastitis in the cow – a tradition or an archaism?**
Dr E Hillerton, Institute for Animal Health, Compton, UK

09.35–10.10 **Assessment of cows for use of non-antimicrobial dry cow product**
Dr D O'Rourke, Pfizer, Kent, UK

10.10–10.45 **Tuberculosis - new light from an old window.**
Dr S Neill, Department of Agriculture & Rural Development and Queen's University, Belfast, UK

10.45–11.15 **Coffee and posters**

11.15–11.50 **Brucellosis - new aspects of an old disease**
Dr A McMillan, VLA, Surrey, UK

11.50–12.25 **Zoonotic potential of *Mycobacterium avium* subsp. *paratuberculosis*: the current position**
Dr I Grant, Queen's University, Belfast, UK

12.25–13.00 **The level of susceptibility to scrapie and BSE is a function of strain of agent, route of infection and the host protein PrP**
Dr W Goldmann, Institute for Animal Health, BBSRC, UK

13.00–14.00 **Lunch and posters**

Session 2. Food Biotechnology

Chair: Prof G Fitzgerald, UCC, Ireland

14.00–14.35 **Commercial production of food enzymes**
Mr R Piggot, Quest International, Chicago USA

14.35–15.10 **Lessons from a Probiotic Genome**
Dr D van Sinderen, UCC, Ireland

15.10–15.45 **Microbial solutions to microbial problems; bacteriocins as tools for the control of undesirable flora in food**
Prof C Hill, UCC, Ireland

15.45–16.15 **Tea and posters**

16.15–16.50 **Food grade bacteria as cell factories for the production of food ingredients**
Dr E Smid, NIZO, Netherlands

16.50– 7.25 **Exploiting genetically modified microorganisms in the agricultural and food sectors**
Prof F O'Gara, UCC, Ireland

Wednesday 14 July 2004

Session 3. Human Health

Chair: Dr T Quigley, Safefood, UK

09.00–09.35 ***Campylobacter jejuni* – 'The Enigma File'**
Prof E Bolton, HPA, UK

MICROBIOLOGY challenges and opportunities

This programme was up to date at the time of publication but may be subject to change. For the very latest information and an online booking form please visit the Society website at www.sfam.org.uk/sumconf.html

09.35–10.10 **Salmonella: the interface between microbiology and epidemiology in outbreak investigations**
Dr E J Threfall, CPHL, LEP, Colindale, UK

10.10–10.45 **Verotoxigenic *E coli***
Prof J Mainil, Univ of Liège, Belgium

10.45–11.15 **Coffee and posters**

11.15–11.50 **The gastrointestinal phase of *Listeria monocytogenes* infection**
Dr C Gahan, UCC, Ireland

11.50–12.25 **Viruses in foodborne illness**
Dr M Carter, University of Surrey, UK

12.25–13.30 **Lunch**

Session 4. Offered papers

(student and non-student)
Chair: Mrs M Harrison
(SfAM Hon Meetings Secretary)

13.30–13.45 **Student paper 1**

13.45–14.00 **Student paper 2**

14.00–14.15 **Student paper 3**

14.15–14.30 **Student paper 4**

14.30–14.45 **Student paper 5**

14.45–15.00 **Student paper 6**

15.00–15.30 **Tea and posters**

Chair: Dr M Adams,
University of Surrey, UK

15.30–15.50 **Non-student paper 1**

15.50–16.10 **Non-student paper 2**

16.10–16.30 **Non-student paper 3**

16.30–16.50 **Non-student paper4**

16.50–17.10 **Non-student paper 5**

17.10–17.30 **Non-student paper 6**

Chair: Dr P Silley (SfAM Hon President)

17.30–18.00 **W H Pierce Prize Winner**

18.00–18.30 **SfAM Annual General Meeting**

Thursday 15 July 2004

Session 5. Novel Processes and Products

Chair: Dr P Silley (SfAM Hon President)

09.00–09.35 **Advances in thermal processing**
Mrs J Gaze, Campden & Chorleywood Food Research Association, Chipping Campden, UK

09.35–10.10 **Microbial inactivation by New technologies – thermal and non thermal**
Prof R Pagán, Universidad de Zaragoza, Zaragoza, Spain

10.10–10.45 **Microbiology of pressure treated foods**
Dr M F Patterson, Dept of Agriculture & Rural Development and Queen's University Belfast, UK

10.45–11.15 **Coffee and posters**

11.15–11.50 **From concept to consumer – the path to commercialising a probiotic**
Dr B Kiely, Dept Alimentary Health, UCC, Ireland

11.50–12.25 **Overcoming the technological hurdles in the development of probiotic foods**
Dr P Ross, Moorepark, Fermoy, Ireland

12.25 **Close of Conference and Lunch**

CPD ACCREDITATION

A total of **23 credits** have been awarded to this conference, broken down as follows: Monday 12 July: **1 credit.** Tuesday 13 July: **8 credits.** Wednesday 14 July: **10 credits.** Thursday 15 July: **4 credits**

Trade Show

Anyone wishing to exhibit at the trade show please contact Lynne Boshier at the Society Office.
Email: lynne@sfam.org.uk

CPD ACCREDITATION

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Thursday 15 July: **4 credits**

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

DAIRY & FOOD MICROBIOLOGY

challenges and opportunities

sfam SUMMER CONFERENCE ● CORK, IRELAND 12-15 July 2004

Venue

Jurys Hotel is unquestionably Cork's finest hotel, combining top class facilities and service with the warmth and friendliness for which Corkonians are renowned.

Located on the banks of the River Lee, the hotel is just a 5 minute walk from the city's bustling business, shopping and entertainment districts. The newly refurbished ground floor comprises the Glandore Restaurant with its wide menu selection, a lively atmosphere in Kavanagh's traditional Irish Pub and the Library Lounge, perfect for a relaxing drink.

BOOKING FORM and INVOICE

SFAM SUMMER CONFERENCE 2004 12 - 15 JULY 2004

Dairy & Food Microbiology: challenges and opportunities

Only ONE person per form please. If additional forms are required please photocopy this one
CLOSING DATE FOR REGISTRATIONS: Friday 11 June 2004. A LATE BOOKING FEE of £30.00 will be applied to all bookings made after this date.

FEES

	Full Members	Student, Honorary, Associate & Retired Members	Student Non - Members	Non - Members
Whole Conference Rate at Jury's Hotel: inclusive of registration fee, coffee breaks, lunches, dinners, including Society dinner, Distillery Visit and accommodation for the entire conference	£400.00	£200.00	£400.00	£595.00
Whole Conference Rate at Lancaster Lodge or Jury's Inn: inc. of registration fee, coffee breaks, lunches, dinners, including Society dinner, Distillery Visit and accommodation for the entire conference	£200.00	£100.00	£300.00	£495.00
Day Rate: 08.30 - 17.00 hours per day, or part thereof, inc. of registration fee, coffee lunch and tea	£100.00	£50.00	£100.00	£150.00
Overnight accommodation: en-suite room per night inclusive of breakfast	**Monday, Tuesday or Wednesday night. (All membership classes pay the same rates) £100.00 per night** (Jury's Hotel) OR **£67.00 per night** (Lancaster Lodge or Jury's Inn)			

YOUR COSTS

Charges - please tick the applicable box(es)				Amount
☐ **Whole Conference Rate at Jury's Hotel:**				£
☐ **Whole Conference Rate at Lancaster Lodge or Jury's Inn:**				£
☐ **Day Rate** (please tick the DAY(S) you wish to attend):	**Tues 13th:** ☐	**Weds 14th:** ☐	**Thurs 15th:** ☐	£
☐ **Overnight accommodation:** (please tick the NIGHT(S) you wish to stay and tick the LOCATION: Please note that space in Jury's Hotel is limited. Late applicants will be lodged at Jury's Inn or Lancaster Lodge	**Mon 12th:** ☐	**Tues 13th:** ☐	**Weds 14th:** ☐	£
	Jury's Hotel: ☐	**Jury's Inn:** ☐	**Lancaster Lodge:** ☐	
☐ **I wish to attend the Society Dinner on Wednesday evening (This is included in the Whole Conference Rate but costs £50.00 for delegates who elect to pay the Day rate).** Please note that numbers are limited:				£
☐ **I wish to attend the Distillery Visit on Tuesday evening (This is included in the Whole Conference Rate but costs £58.00 for delegates who elect to pay the Day rate).** Please note that numbers are limited:				£
☐ **I wish to attend the Brains Trust Buffet and Social Evening on Monday evening (This is included in the Whole Conference Rate but costs £20.00 for delegates who elect to pay the Day rate):**				£
☐ **LATE BOOKING FEE** Payable for all bookings made after Friday 11 June 2004:				£30.00
			TOTAL AMOUNT REMITTED:	£

YOUR DETAILS

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

Address: _____

_____

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 your are booking after 11 June 2004) **£** _____

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 SUMMER CONFERENCE 2004 12 - 15 JULY 2004

☐ **I wish to apply for a SfAM Studentship grant to attend the 2004 SfAM Summer Conference**

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!

Joint sfam and ASM Meeting
BACTERIAL RESISTANCE to ANTIBIOTICS and DISINFECTANTS

New Orleans, USA 23 - 27 May 2004

SfAM and the American Society for Microbiology (ASM) are jointly organizing two sessions dedicated to bacterial resistance to antibiotics and disinfectants at the ASM 104th General Meeting in New Orleans on 23-27 May 2004. This programme aims to expand from the first conference on biocide and antibiotic resistance in bacteria organised by the Society in Swansea in the UK in July 2001. The role of misuse of antibiotics in proliferating antibiotic resistance is appreciated, however, the potential effect of biocide use in clinical and domiciliary environments on the emergence of antibiotic resistance is less understood. In addition, the extensive, and often improper, use of biocidal products has been claimed to exacerbate the spread of antibiotic resistance. Several institutions in the US and UK have recognized the problem and have called for a better understanding of the mechanisms which might lead to possible cross-resistance between antibiotics and biocides. While this issue is recognized by some working at the boundaries of clinical and environmental microbiology, it merits greater recognition by our professional society and society at large; ultimately the end user of many biocidal products.

A symposium session entitled **"Biocide and antibiotic resistance in bacteria: *policies and issues: where do we go from here?"*** will explore the issues and policies related to the use of biocides in relation to bacterial resistance to both biocides and antibiotics. This will be followed by a colloquium session entitled **"Biocide and antibiotic resistance in bacteria: an update"** which will present the latest scientific evidence of possible linkage between biocide and antibiotic resistance in bacteria.

Proposed Programme

Wednesday 26th May 2004

Room 207, New Orleans Convention Center, 08.00 - 10.30

Symposium: Biocide and antibiotic resistance in bacteria: policies and issues: where do we go from here?

Conveners: J-Y Maillard (University of Brighton, UK) and M S Favero (Advanced Sterilization products, Johnson & Johnson, Irvine, USA).

Similarities and differences between bacterial responses to biocides and antibiotics.
A D Russell (Cardiff University, Wales, UK).

Use of disinfectants in health-care facilities: a cause for concern?
W A Rutala (University of North Carolina, USA).

Clinical significance of the emergence of bacterial resistance in the hospital environment.
B D Cookson (Health Protection Agency, London, UK).

Prospective bacterial targets as a means of overcoming bacterial resistance to biocides and antibiotics: the future of antimicrobials.
D J Payne (GlaxoSmithKline, Collegeville, USA).

Antibiotic and biocide resistance in bacteria: reality or theory? A summing up.
M S Favero (Advanced Sterilization products, Johnson & Johnson, Irvine, USA).

14.30 - 17.00

Colloquium: Biocide and antibiotic resistance in bacteria: an update

Conveners: M S Favero (Advanced Sterilization products, Johnson & Johnson, Irvine, USA) and J-Y Maillard (University of Brighton, UK)

Biocide and antibiotic resistance in bacteria: the need for an update.
J-Y Maillard (University of Brighton, UK).

Target sites for biocidal agents: primary vs. multiple target sites revisited.
S P Denyer (Cardiff University, Wales, UK).

Biocide usage and antibiotic resistance: linkage in the clinical and domestic environments?
S B Levy (Tufts University School of Medicine, Boston, USA).

Efflux mechanism: current knowledge: a major mechanism involved in bacterial resistance to antimicrobials.
K Poole (Queen's University, Kingston, Canada).

Bacterial biofilm and resistance to antimicrobial agents: a better account of real life situations.
P Gilbert (University of Manchester, UK).

There will be a call for posters in this area by the ASM organiser. Please check the ASM website (address below) for further details.

Thank you

ADVANCED STERILIZATION PRODUCTS® a Johnson & Johnson company Division of Ethicon, Inc.

SDA

SfAM would like to thank **Advanced Sterilization Products** (a Johnson & Johnson Company, Irvine, CA), **the Soap and Detergent Association** and t**he Cosmetic, Toiletry, and Fragrance Association** (SDA/CTFA, Washington, DC) for their generous contributions which will enable leading experts to travel to New Orleans to attend this meeting.

Further information about this meeting can be obtained from the Society Office and from the ASM website at: www.asm.org/Meetings/Index.asp?bid=470

London Food Study Group and Sfam Joint Conference

Food Contamination Risks associated with microorganisms and pests

13 -14th May 2004

Chartered Institute of Environmental Health, 15 Hatfields, Southwark London, SE1 8DJ, UK

This conference will focus upon how microorganisms survive and transfer via cross-contamination within the food supply and production chains. The role of pests in transmission will also be highlighted. Risks of illness as well as cultural acceptability of pests as foreign bodies within 'organic' produce will be further discussed, along with the legal context of contamination.

Draft Summary of Programme in order of Presentations:

Thursday 13th May 2004

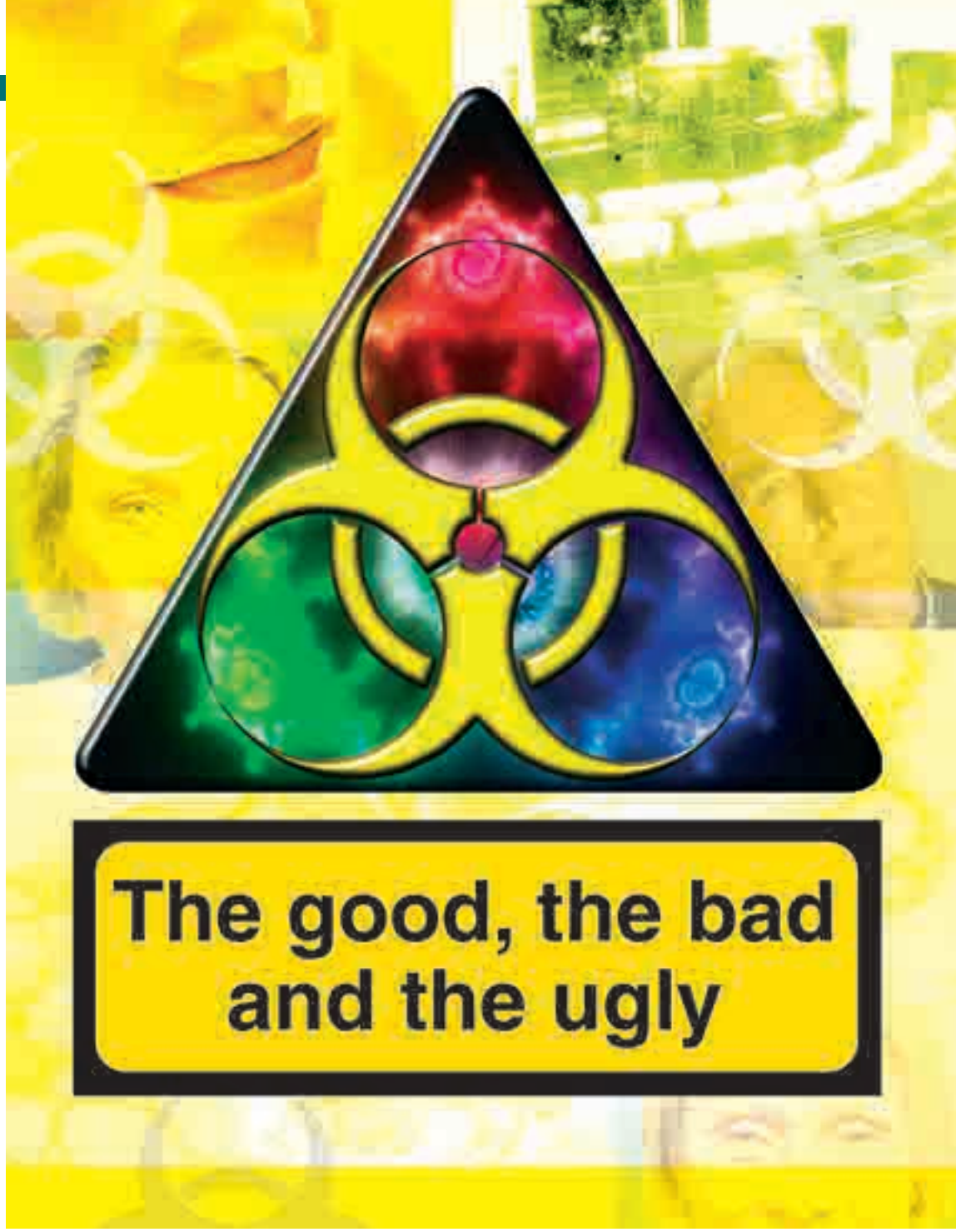
Name	Job/Organisation	Presentation
Professor T H Pennington	University of Aberdeen, Dept of Medical Microbiology	Keynote address
Dr Slim Dinsdale	Food Safety and Quality Consultant	Legal aspects of food contamination
Professor Moray Anderson	Technical Director and Group Director, Killgerm Group	Cockroaches and their role in spreading pathogens
TBC	TBC	Rodents and their role in spreading pathogens
Mr Edward Cooke	University of Birmingham	The survival of *Serratia marcescens* on Houseflies (*Musca domestica*) electrocuted by electric fly killer
TBC	TBC	The meaning of 'organic food'
Dr Alec Kyriakides	Food Safety Manager for Sainsbury's Supermarkets Ltd	'Contamination' in organic food – A retailers perspective (draft title)
TBC	FSA	TBC

Friday 14th May 2004

Dr John Cowden	SCIEH	TBC
Dr Belinda Stuart-Moonlight	Moonlight Environmental Ltd	Microbial distribution and transfer within kitchens
Dr Richard Meldrum	National Public Health Service Wales	The Welsh Food Microbiological Forum and the shopping basket surveillance programme for ready-to-eat foods
Dr Roy Betts	Head of Microbiology, Campden and Chorleywood FRA	Microbiological Risks of handling Raw Meat in the Domestic Environment
Mr Richard Elson	Senior Scientist HPA, CDSC	*Salmonella* and raw shell eggs - do caterers know what they need to know?
Dr Karen Hall	Campden and Chorleywood FRA	The microbial ecology of chilled food factories; evidence for persistent *Listeria* spp. and *Escherichia coli* strains

Costs

£80 + VAT for the two days (includes registration, lunch and teas/coffees). Please contact the Society for more details and booking arrangements. Contact: Dr Belinda Stuart-Moonlight at: office@me-ltd.biz.



Professor Mike Peck
discusses the good, bad and ugly aspects of *Clostridium botulinum* neurotoxins

THE BOTULINUM neurotoxins potentially impact on our lives in different ways. These may be good, bad or ugly. In recent years, extremely small quantities of these most potent of toxins have been used in a beneficial way to treat a variety of neurological conditions such as torticollis, blepharospasm and strabismus. The botulinum neurotoxins cause botulism, a severe disease of man and animals. In view of its potency, botulinum neurotoxins have also attracted attention as potentially ugly weapons of mass destruction.

From a phylogenetic point of view the taxonomic structure of *C. botulinum* leaves much to be desired. Six physiologically and phylogenetically distinct clostridia can produce botulinum neurotoxin (Table 1); four are designated *C. botulinum* and two are not! The practice has been to retain the name of *C. botulinum* to emphasise the importance of neurotoxin production. However, when some strains of *C. baratii* and *C. butyricum* were recently found to produce the neurotoxin, it was decided not to call these organisms *C. botulinum*. For each of the six organisms, a non-neurotoxigenic phylogenetically equivalent organism is known (Table 1). For example, proteolytic (Group I) *C. botulinum* is similar to *C. sporogenes*, except for the ability to produce neurotoxin. The different physiology of these organisms is reflected by the circumstances in which they present a hazard. For example, proteolytic (Group I) *C. botulinum* and non-proteolytic (Group II) *C. botulinum*, and very occasionally neurotoxigenic *C. baratii* and *C. butyricum*, have been associated with foodborne botulism (Table 1).

Seven botulinum neurotoxins (A to G) are produced, with the location of the neurotoxin gene and toxin type dependent on the producing organism (Table 1). The neurotoxins were originally distinguished on the basis of their antigenic response. More recent research has established the amino acid sequence of the different neurotoxins, and also the crystal structure of several neurotoxins. The mode of action of the neurotoxins is now well understood. The neurotoxins act primarily at peripheral cholinergic synapses blocking release of the neurotransmitter

acetylcholine. All botulinum neurotoxins comprise a heavy chain and a light chain and are often associated with other proteins (e.g. haemagglutinin and non-toxin non-haemagglutinin).

The heavy chains are responsible for delivery of the light chains to the cytosol of the motor neuron, their site of action. The light chains possess zinc endopeptidase activity, and cleave protein components of the acetylcholine-containing synaptic vesicle docking/fusion complex. Each light chain cleaves a specific protein in this complex at a specific site. This cleavage prevents binding of acetylcholine-containing synaptic vesicles, preventing neurotransmitter release and leading to flaccid paralysis of the muscle. Flaccid paralysis of the respiratory muscles can result in death if not treated.

Foodborne botulism is an intoxication resulting from consumption of pre-formed botulinum neurotoxin. The consumption of as little as 0.1g of food in which a neurotoxin-producing clostridia has grown can result in illness (as little as 30ng of neurotoxin may be sufficient). It is a rare but severe disease. While recovery may still take months or even longer, rapid treatment with equine antitoxin and supportive therapy has led to a reduction in the fatality rate (now approximately 10% of cases). This proportion is still high for a foodborne illness. On the rare occasions when commercial foods are involved in botulism outbreaks, the medical and economic consequences can be enormous. It has been estimated that in the USA the cost per case of botulism is approximately $30 million, compared with $10,000-12,000 for each case of illness associated with *Listeria monocytogenes* and *Salmonella*.

Proteolytic *C. botulinum* and non-proteolytic C. *botulinum* are responsible for most cases of foodborne botulism. As they differ physiologically (i.e. survive and grow under different conditions), they present a hazard in different types of foods (Table 2). Proteolytic *C. botulinum* produces spores of high heat resistance and has a minimum growth temperature of 10° to 12°C. The canning process for low-acid foods is designed to inactivate spores of this organism, and botulism outbreaks have occurred when the full heat treatment has not been delivered. Spores of non-proteolytic *C. botulinum* are of moderate heat resistance, but this organism can multiply and form neurotoxin at temperatures as low as 3°C. Botulism outbreaks associated non-proteolytic *C. botulinum* have occurred most frequently with processed fish, with for example outbreaks involving vacuum packed smoked fish reported in Sweden (1991 and 1994) and in Germany (1997).

The name "botulism" was given to a disease reported in central Europe in the nineteenth century that was frequently associated with consumption of blood sausage; the word 'botulism' being derived from the Latin botulus meaning sausage. At the end of the nineteenth century, Emile van Ermengem first isolated a causative organism (initially called *Bacillus botulinus*) from home made raw salted ham and the spleen of a man who later died of botulism. This outbreak, in Belgium, affected 23 musicians (three fatally). The isolated strains, now lost, were probably non-proteolytic *C. botulinum*. Over the next three decades a great number of outbreaks were identified across the world. Many of these were associated with the wider use (commercial and at home) of a canning process to extend shelf life. In a seven-year period, 1918 through 1924, there were 107

Table 1 Characteristics of the six phylogenetically distinct clostridia that produce botulinum neurotoxin

Organism	Non-neurotoxigenic equivalents	Neurotoxins produced	Location of neurotoxins gene	Associated with human botulism			Associated with animal botulism
				foodborne	infant	wound	
C. botulinum Group 1 (proteolytic)	*C. sporogenes*	A, B, F	Chromosome	Yes	Yes	Yes	Yes
C. botulinum Group 2 (non-proteolytic)	no name given	B, E, F	Chromosome	Yes	—	—	Yes
C. botulinum Group 3	*C. novyi*	C, D	bacteriophage	—	—	—	Yes
C. botulinum Group 4 (*C. argentinense*)	*C. subterminale*	G	plasmid	—	—	—	—
C. baratii	all typical strains	F	Chromosome	Yes	Yes	—	—
C. butyricum	all typical strains	E	Chromosome	Yes	Yes	—	—

Table 2 Examples of recent outbreaks of foodborne botulism

Year & Country	Food associated with outbreak	No. cases (deaths)	Toxin type: organism
1989 UK	Commercially produced hazelnut yoghurt	27 (01)	Type B: proteolytic *C. botulinum*
1991 Egypt	Commercially produced uneviscerated salted fish ('faseikh')	>91 (18)	Type E: Non-proteolytic *C. botulinum*
1992 Spain	Commercially produced green beans/artichokes	04 (01)	Type B: proteolytic *C. botulinum*
1993 Italy	Commercially produced aubergine in oil	07 (00)	Type B: proteolytic *C. botulinum*
1994 USA	Restaurant potato dip '(skordalia') and aubergine dip ('meligianoslata')	30 (00)	Type A: proteolytic *C. botulinum*
1996 Italy	Commercially produced mascarpone cheese	08 (01)	Type A: proteolytic *C. botulinum*
1996 India	Crsip made of gram flour ('sevu')	34 (03)	Type E: *C. butyricum*
1997 Germany	Vacuum packed hot smoked white fish	02 (00)	Type E: Non-proteolytic *C. botulinum*
1997 Iran	Traditionally made cheese preserved in oil	27 (01)	Type A: proteolytic *C. botulinum*
1997 Argentina	Home-cured ham	06 (00)	Type E: Non-proteolytic *C. botulinum*
1998 Croatia	Ham	20 (00)	**b**
1998 UK	Home prepared bottled mushrooms in oil (from Italy)	02 (01)	Type B: proteolytic *C. botulinum*
1999 Morocco	Commercially produced Mortadella sausage	78 (20)	Type B: *C. botulinum***a**
2001 USA	Fermented beaver tail and paw	03 (00)	Type E: Non-proteolytic *C. botulinum*
2001 Canada	Fermented salmon roe (two outbreaks)	04 (00)	Type E: Non-proteolytic *C. botulinum*
2001 USA	Spaghetti noodles and meat sauce	01 (00)	Type F: *C. baratii*
2001 USA	Commercially produced chilli sauce	16 (00)	Type A: proteolytic *C. botulinum*
2002 South Africa	Commercially produced tinned pilchards	02 (02)	Type A: proteolytic *C. botulinum*
2002 USA	Muktuk (from Beluga whale)	08 (00)	Type E: Non-proteolytic *C. botulinum*
2003 France	Halal sausage	04 (00)	Type B: *C. botulinum***a**
2003 Ukraine	Home prepared canned corn	06 (00)	Type B: proteolytic *C. botulinum*
2003 South Korea	Commercially produced canned sausage	03 (00)	**b**
2003 Norway	Home prepared 'rakfisk'	04 (00)	Type E: Non-proteolytic *C. botulinum***a**
2003 Germany	Home prepared dried fish	03 (00)	Type E: Non-proteolytic *C. botulinum*

a Only toxin identified - unclear whether *C. botulinum* type B or non-proteolytic *C. botulinum* type B
b Toxin reported as present, but type not indicated. **c** likely toxin type and organis

botulism outbreaks in the USA involving 367 cases, of which 230 were fatal. A great number were associated with the home canning of vegetables. One particularly unfortunate outbreak occurred in Albany, Oregon, in 1924. All twelve members of the Gerber family died after consuming home-canned string beans containing type A neurotoxin. The first outbreak of botulism reported in the UK occurred at Loch Maree in August 1922, and involved consumption of wild duck-paste sandwiches containing type A neurotoxin. There were eight cases, all fatal.

Through the understanding and implementation of effective control measures, the incidence of botulism is today generally much lower than in the early part of the twentieth century. Foodborne botulism involving commercial processing is uncommon, but the consequences can be severe. Most cases are now associated with home-prepared foods, when known control measures have not been implemented. For example, in Poland from 1984-1987, there were 1301 outbreaks reported giving 1791 cases, of which 46 were fatal. In Russia from January 1998 to September 1999, there were 542 outbreaks giving 743 cases of which 62 were fatal. These high incidences were associated with an increased reliance on the home bottling/canning of foods, reflecting difficult economic conditions. The incidence in Poland has fallen considerably in recent years. Many other countries have lower, but significant rates of foodborne botulism. For example, over the past 20 years, approximately 35 cases have been reported annually in Italy, with many associated with home-prepared vegetables in oil. Approximately 25 cases have been reported annually in France and Germany, and frequently involved home/farm prepared hams. In the USA, approximately 30 cases have been reported per year, with most cases associated with home canned vegetables or fermented marine products (e.g. fermented beaver tail and paw, muktuk (whale meat)) prepared in Alaska.

Figure 1 Infant showing "floppy head", typical symptoms of infant botulism. (Photo courtesy of Dr. Stephen Arnon, California Department of Health Services).

Approximately 10 cases have been reported annually in Spain, and involved home canned vegetables. These foods are not generally prepared at home in the UK, consequently the incidence of foodborne botulism is lower. A total of eleven outbreaks of foodborne botulism have been reported in the UK, with 58 cases, of which 19 were fatal. The largest outbreak occurred in 1989, and involved commercially produced hazelnut yoghurt. The heat treatment given to the hazelnut conserve was not sufficient to inactivate spores of proteolytic *C. botulinum*, and the conserve then supported bacterial growth and production of type B neurotoxin. This toxic mixture was then added to the natural yoghurt. The outbreak affected 27 people, of which one died. The most recent botulism outbreak occurred in 1998, two people were affected, of which one died. The implicated food was home prepared bottled mushrooms in oil that was imported from Italy. Some examples of recent outbreaks of foodborne botulism are given in Table 2.

A recent finding has been the association of neurotoxigenic *C. baratii* and *C. butyricum* with foodborne botulism. A suspected outbreak involving neurotoxigenic *C. baratii* type F, was reported in USA in January 2001, and was associated with consumption of spaghetti noodles and meat sauce by a 41 year old woman. The woman eventually recovered, although 12 weeks were spent on a life support machine. The first outbreak involving neurotoxigenic *C. butyricum* was reported in China in 1994 and was associated with consumption of a homemade salted and fermented paste of soybeans and wax gourds (six cases, three fatal). It was subsequently established that two earlier outbreaks of type E botulism in China involving soybean dishes were also associated with neurotoxigenic *C. butyricum*. A further suspected outbreak was reported in India in 1996, and involved consumption of *sevu* (crisp made of gram flour) at a school cafeteria (34 cases, three fatal).

It is essential that as new technologies and approaches to food processing are introduced, measures are in place to ensure that the foodborne botulism hazard is appropriately controlled (i.e. *C. botulinum* does not become an emerging pathogen). In this respect, research has and is focused on ensuring the continued safe development of refrigerated processed foods with an extended shelflife (i.e. chilled ready meals). These foods address consumer demand in requiring minimal preparation time, are of high quality and contain few preservatives. Sales of these foods have increased tremendously over the last ten years. The foods receive a moderate heat process (typical maximum of 75° to 95°C) that is intended to minimise loss of sensory and organoleptic quality. The food is then cooled rapidly, and stored at refrigeration temperatures (<-8°C). These foods are not sterile, and shelflife is dependent on a combination of the heat process, storage temperature, and perhaps also intrinsic properties of the food.

Additionally, these foods are often packed under vacuum or an anaerobic atmosphere, restricting growth of aerobic, but not anaerobic, bacteria. This minimal process favours spore-forming microorganisms that grow in the absence of oxygen at refrigeration temperatures. In particular, concern exists about the potential for growth and neurotoxin production by non-proteolytic *C. botulinum* in the absence of a competing microflora, and the associated foodborne botulism hazard.

In response to these concerns, the growth domain

has been described, and predictive models have been developed for the thermal death and growth of non-proteolytic *C. botulinum*. Several of these models are freely available through Growth Predictor (www.ifr.ac.uk/Safety/GrowthPredictor/default.html) or the Pathogen Modeling Program (www.arserrc.gov/mfs/PMP6_Start.htm). Published (and in some cases also unpublished) original growth and death curves are compiled and also available free of charge in ComBase (www.ifr.ac.uk/combase/default.html).

A further development has been that of a process risk model for gnocchi (a minimally processed potato product). Here the techniques of quantitative risk assessment have been used to consider risk throughout the entire food chain. The product was found to be very safe with respect to the foodborne botulism hazard. This work has complemented traditional challenge testing.

Infant and wound botulism are infections. Proteolytic *C. botulinum* and neurotoxigenic *C. baratii* and *C. butyricum* are most commonly associated with infant botulism. The first clinical cases of infant botulism were described in California in 1976, although subsequent investigations identified earlier cases. Infant botulism has now been reported in many countries, with six cases described in the UK. The most recent case was in June 2001 and involved a five month old baby. In the USA, infant botulism is the most commonly reported form of botulism, with approximately 80 – 100 cases per year. An immature intestinal flora in infants is insufficient to prevent colonisation by neurotoxigenic clostridia, allowing ingested spores to germinate leading to cell multiplication and neurotoxin production. Infants aged between two weeks and six months are most susceptible. The disease is characterised by extended constipation and flaccid paralysis.

A frequent observation is paralysis of the head and neck muscles, leading to difficulty in holding the head erect (Figure 1). Infant botulism is rarely fatal. Equine antitoxin and antibiotics are not used to treat cases of infant botulism. Instead, treatment consists of meticulous supportive care to avoid potentially fatal complications. In the USA, human botulism immune globulin (BIG) is given to aid recovery. Two sources of spores have been identified, honey and general environmental contamination (e.g. soil, dust). It is estimated that between 10 and 100 spores are sufficient to bring about infection. Several cases of infant botulism have been linked to consumption of honey containing spores of neurotoxigenic clostridia. In order to minimise this risk, it is recommended that jars of honey should carry an appropriate warning such as *'unsuitable for infants under 12 months'*. A similar disease is very rarely reported in adults and occurs when competing bacteria in the normal intestinal flora have been suppressed (e.g. by antibiotic treatment or major surgery).

Wound botulism was first described in the USA in 1943 and was associated with growth and neurotoxin production by proteolytic *C. botulinum* type A in a substantial wound, following a fall from a building. Until 1982, wound botulism remained uncommon and was associated with infection following traumatic injury (e.g. cutting hand with saw, foot puncture wound). Following the description of the first case of wound botulism associated with infection following drug abuse (skin popping of heroin) in 1982, there has been an increase in the disease. Since 1995 approximately 20 – 40 cases of wound botulism have been reported annually in the USA. Prior to 2000 wound botulism had not been reported in the UK, but 18 cases were confirmed in 2000 - 2002 and all were associated with drug abuse. Strains of proteolytic *C. botulinum* type A or type B have been isolated from the wounds. Cases of wound botulism associated with drug abuse have now been reported in many countries. In the UK other clostridia (e.g. *C. novyi*, *C. tetani*, *C. histolyticum*) have also caused infection following drug abuse.

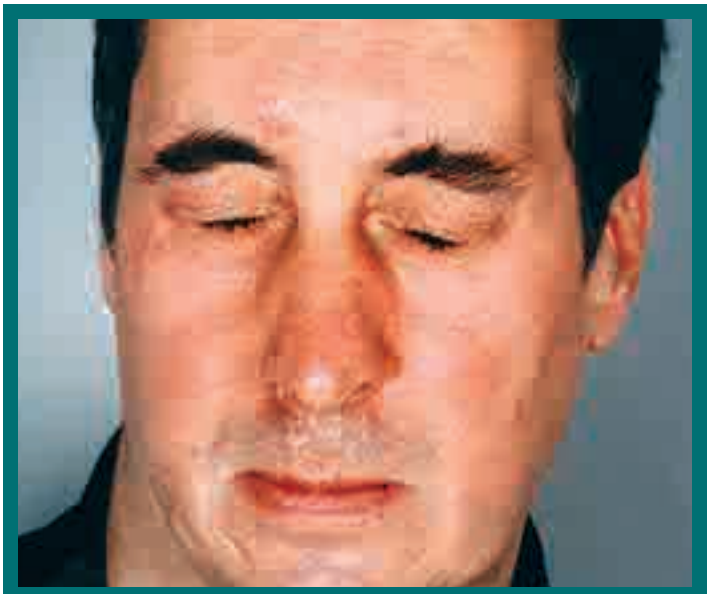


Figure 2A, Blepharospasm (focal dystonia of the orbicularis oculi; early symptoms may include, uncontrollable blinking [especially in bright light], eye irritation, photosensitivity)

Botulism also occurs in many types of animal other than man (Table 1). Proteolytic *C. botulinum* has caused outbreaks of botulism in cattle and horses, the latter appearing particularly sensitive to neurotoxin. Outbreaks involving non-proteolytic *C. botulinum* type E have probably been associated with consumption of toxic fish. *C. botulinum* Group III is particularly associated with botulism in animals. Strains producing type C neurotoxin are associated with avian botulism and also botulism in cattle, horses and other animals, while strains producing type D neurotoxin have caused botulism in cattle and sheep. Outbreaks of botulism involving animals can be very large. For example, 5,500 beef cows died in Queensland in 1990, and 44,000 foxes died in Finland in 2002. Major outbreaks involving waterfowl can be even larger. It is estimated that 4 – 5 million waterfowl died in the western states of USA in 1952. Avian botulism is a significant cause of bird death in the UK. Avian botulism has also affected endangered species, such as the brown pelican (1996 in USA) and black-faced spoonbill (2002–3 in Taiwan).

Other aspects of botulinum neurotoxins feature in the work of Dr. Edward J. Schantz and Dr. Alan B. Scott, who pioneered the use of botulinum neurotoxin for the treatment of a variety of human diseases.

Figure 2B, Torticollis (affects the muscles of the neck, leading to inclination of the neck).

Figs 2A, 2B and 2C Photos courtesy of Ipsen

Dr. Schantz trained as a biochemist. He developed the necessary protocols, and then provided Dr. Scott with highly purified neurotoxin. Dr. Scott, an eye surgeon, explored the use of botulinum neurotoxin to block neurotransmitter release and reduce muscle activity, thereby providing an alternative to invasive surgery. Initial research (late 1960s and early 1970s) focussed on the treatment of strabismus (hyperactive muscle activity, leading to misalignment of the eyes) in animals. Tests then moved to human volunteers, and in 1989 the US Food and Drug Administration approved the use of botulinum neurotoxin type A for the treatment of strabismus, blepharospasm (spasm of eyelid) and hemifacial spasm (spasm of face; Figs 2a - 2c).

Figure 2C, Hemifacial spasm (spasm of the face; tends to affect the left side of the face more frequently than the right, with the muscles on the side of the mouth particularly affected)

Treatment consists of the injection of a few nanograms of neurotoxin at an appropriate site.

Three preparations of botulinum neurotoxin are currently approved in various countries, Botox® and Dysport® (both preparations of type A neurotoxin), and Neurobloc® (also known as Myobloc®, a preparation of type B neurotoxin). Today a wide variety of conditions are treated with botulinum neurotoxin, including; strabismus, blepharospasm, hemifacial spasm, torticollis (inclination of the neck), excessive perspiration (excessive stimulation of the sweat glands), paediatric cerebral palsy spasticity and migraines. The botulinum neurotoxin is also much used for cosmetic purposes. A report published in October 2003 describes the successful use of botulinum neurotoxin to treat blepharospasm in a dog.

Development and use of botulinum neurotoxin as a potential bioweapon began at least 60 years ago. Although the 1972 Biological and Toxin Weapons Convention prohibited offensive research and production of biological weapons, this did not entirely prevent further development. For example, the Soviet Union and Iraq subsequently produced botulinum neurotoxin for potential use as a bioweapon. On at least three occasions between 1990 and 1995, aerosols of botulinum neurotoxin were dispersed by the Aum Shinrikyo cult in Japan. These terror attacks apparently failed.

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Bioterrorism

Lucy Harper discusses the use of infectious biological agents in warfare

IN 1346 TARTAR warriors camped outside the city of Kaffa in the Black Sea in an attempt to besiege it. A large percentage of the population at this time were carrying the 'black plague' — the Tartars were no exception and it wasn't long before the disease had spread through the besiegers. In an attempt to end the siege by spreading the disease, the Tartars catapulted plagued body parts over the city walls. Much later, during the battles of 1754-1767, French and British soldiers unwittingly infected American Indians by donating blankets used by settlers suffering from smallpox. The native tribes were soon killed off.

These are just two of the first recorded examples of the use of infectious biological agents in warfare. Since then, although the number of agents of biological warfare has not increased a great deal, the potential danger posed by such agents when used as weapons, remains high. Anthrax, smallpox, and botulism, have all been used as biological weapons. Despite the fundamental differences between these organisms, they exhibit some similar properties that make them ideal candidates for biological attack. Due to the apparently inoffensive nature of their spores and / or the incubation times of these organisms, an attack is generally not easily detected until the bugs have infected substantial numbers of people. Once the organism has been identified within a population it can still take the community years to recover from such an outbreak. As such, enemies can deploy biological weapons to great effect.

Bacillus anthracis, the bacterium which causes anthrax, can be acquired through direct contact with the skin (cutaneous anthrax), through inhalation (pulmonary anthrax) and through gastrointestinal infection (gastrointestinal (GI) anthrax). The most often fatal forms are GI and pulmonary anthrax primarily because they are not generally detected until it is too late for effective treatment.

Cutaneous anthrax is the most common form of human-acquired anthrax, and is usually acquired by the handling of infected animals. A break in the skin allows the organism access and it causes a primary lesion within 2-7 days after exposure. The primary lesion leads to the development of a characteristic ulcerated black lesion. This usually clears up without treatment but in a small amount of cases can progress to scepticeamia and ultimately death.

In Pulmonary anthrax, *B. anthracis* spores are inhaled and transported to the lymph nodes inside macrophages, where they germinate and the bacteria multiply. Death occurs in >80% of the infected population as a result of subsequent bacteraemia and toxaemia.

GI anthrax is an extremely rare form of anthrax that results from eating insufficiently cooked meat from anthrax-infected livestock. Germination occurs within the macrophage and stimulation of a toxin known as Lethal Factor (LF) ensues. Lethal Factor then stimulates the production of TNF-α and IL-1β. These cytokines are then released into the bloodstream through the destruction of macrophages by LF and death results due to a combination of bacterial infection of the bloodstream and cytokine-induced shock (1).

There are no known cases of human-to-human transmission of anthrax, though death through the acquisition of inhalation anthrax results after 1-2 days after onset of symptoms. The rapid course of this disease reinforces the necessity for early therapeutic intervention (2). Information regarding the potential impact of a malicious attack of anthrax is limited as there have been few recorded incidents. In 1979 there was an accidental release of *B. anthracis* from a Russian bioweapons factory and we all remember the US anthrax 'attack' of September 2001. However, these incidents give very little information regarding an appropriate coping strategy should a widespread attack be instigated (3).

Smallpox (or *Variola*) is a member of the orthopoxvirus genus which includes monkeypox, vaccinia and cowpox. Its incubation period is normally 12-14 days and it is the only orthopox virus which is readily transmitted from person-to-person. Initially the patient experiences high fever, exhaustion, headache and backache. Severe abdominal pain and delirium may also be present at this stage. A rash then appears on the mucosa of

the mouth and pharynx, face, and forearms and spreads to the trunk and legs. Within 1-2 days the rash becomes vesicular and later pustular, with crusts developing on the 8th or 9th day of the rash. Virus titres are highest during the first week of illness and death from the toxaemia associated with circulating immune complexes and soluble variola antigens, is most likely during the second week of illness. Encephalitis may also occur (4).

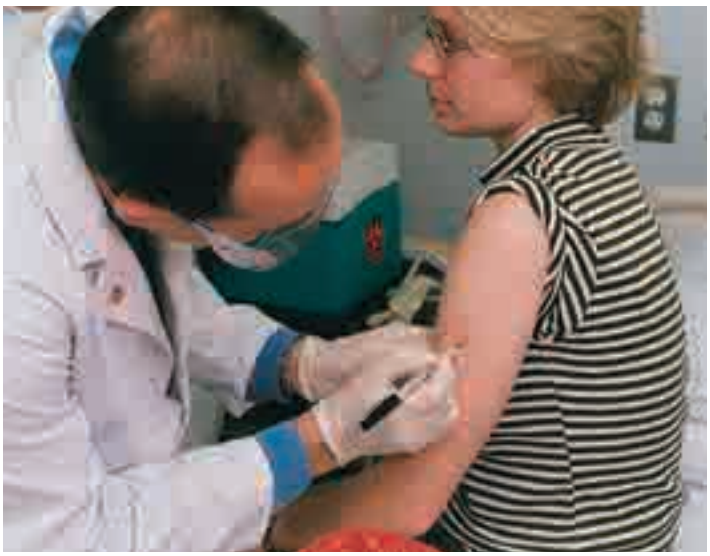
In 1796 it was found that infection with cowpox protected against smallpox, but it wasn't until 1967 that the world health organisation (WHO) began a global campaign to eradicate the disease. This was declared a complete success in 1977. In 1980 the WHO recommended that all countries cease vaccination and that all labs destroy stocks of variola or transfer them to named reference laboratories. In 1999 the WHO recommended that all stocks be destroyed, however the institute of medicine (IOM) wished to maintain stocks for research purposes (4).

In response to the terrorist attacks of September 2001, the US planned to vaccinate 500,000 health workers against smallpox, but unexpected health problems meant that by the end of the programme only 39,000 had been vaccinated (5). Because the use of smallpox vaccine is contraindicated in so many cases, scientists are on the look out for alternatives. The CDC (Centers for Disease Control and Prevention) are now recommending cidofovir, a nucleotide analogue under investigation for the treatment of genital warts and CMV retinitis, be investigated as treatment for smallpox. However its use is limited as it is *'virtually not available by the oral route'*. A lipid tail has been attached onto cidofovir producing hexadecyloxypropyl-cidofovir (HDP-cidofovir), a cidofovir-derivative which is available orally and once administered penetrates cells more effectively than cidofovir (6).

At a conference in Geneva during October 2003, a number of leading experts in the field of bioterrorism put forward a number of differing opinions regarding the preparative measures and handling of potential biological threats, including smallpox. Ken Alibek is a professor at George Mason University, Fairfax, Virginia. He previously headed the former Soviet Union's secret biological weapons programme which, in 1980 embarked upon a programme to produce smallpox in large quantities and adapt it for use in bombs and intercontinental ballistic weapons (4). In 1992 he defected to the United States where he became president of Hadron Advanced Biosystems.He now leads research into developing new forms of medical protection against biological weapons (5). He *'wanted the conference to show that despite eradication in the late 1970s, smallpox was still a serious threat.'*

However, Peter Jahrling, principal scientific adviser to the US Army Medical Research Institute of Infectious Diseases, told journalists that he *'was in favour of mass vaccination of populations in advance of any threat'*. Whereas David Heymann, a WHO infectious diseases expert said that *'WHO recommend mass vaccination in the event of an outbreak'* (5). Mr Jahling added *'one of the problems in vaccinating health workers was the danger of infecting cancer patients, for example, through the vaccine (which is the related virus Vaccinia) for days afterwards'*. But Dr Bill Bicknell, a professor at the Boston University School of Public Health, argued that *'recent research finds negligible risk in vaccinating healthy adults, as opposed to children and sick adults, with existing vaccines'*. He rejected the WHO's four day window recommendation, saying: *'If (you are) vaccinated within four days, the severity of disease is less and you probably don't die, but you do not prevent the disease and you may transmit more disease' (5)*.

Botulism is caused by infection with the anaerobic Gram-positive bacterium *Clostridium botulinum*.



Onset of botulism following inhalation of *Clostridium botulinum* spores is dose-dependent and may occur 24hrs to several days after exposure. The first manifestations tend to be ophthalmological and include double vision, drooping of the upper eyelid, excessive dilation of the pupil, extraocular muscle palsies and photophobia. Other early signs of infection include slurring of speech, dysphonia and difficulty in swallowing. These signs are followed by a progressively descending symmetrical, flaccid paralysis which may culminate in respiratory failure. It is known that if not diagnosed and treated promptly, botulism has significant morbidity and mortality.

Clostridium botulinum spores are widespread and are found in soil, and mud (salt-water and fresh-water). They are resilient and can live for up to 2 hours at 100°C. The neurological symptoms stem from the fact that *Clostridium botulinum* spores trigger the production of a neurotoxin which inhibits acetylcholine release at pre-synaptic nerve-endings. Like many agents used as biological weapons, the ease of administration of minute yet lethal doses (by inhalation), together with its colourless and odourless nature, make botulinum toxin a highly effective chemical weapon. In 1995 Iraq revealed it had deployed over 11,000 litres of botulinum toxin into *SCUD* missiles. Also in 1995, the *Arum Shinrikyo* cult in Japan, prepared botulinum toxin before its attack on the Tokyo subway system but, despite the fact that BT is 100,000 times more toxic than Sarin, it was this chemical warfare agent they decided to employ (7). So what are the coping strategies that we should adopt to counter these threats?

Should the government make guidelines available outlining the most appropriate course of action? One might think this would be sensible. For example, a scientist in Texas was arrested for misinforming the FBI regarding vials of 'plague' (*Yersinia pestis*) which he claimed had 'gone missing'. A top security alert involved the FBI who later accounted for the missing vials claiming, "there is no danger whatsoever". However, the investigation continues.

This case highlights the requirement for governmental intervention and in June 2002, President Bush signed the *Bioterrorism preparedness and Response Act 2002* (BPRA) in the USA. This report is currently being implemented. Although this outwardly appears to be the sensible thing to do, it raises the question of whether it will inhibit research into the long-term effects and treatment of infection with these agents. For example BSE prions are among a group of 'select agents' that, under the BPRA, require security checks for those who are handling them – including any person who has access to them in the lab (8). There is speculation over whether such restrictions place lab research at risk as they have been known to delay the certification of certain laboratories. This may push workers into making the information available freely, for example on the Internet. This may bring into question the quality of the research in the absence of peer-review, but more importantly it allows the work to be made available to all. Most scientists would see this as a benefit, but it may also result in information getting into the wrong hands, negating the whole principle of employing the BPRA in the first place.

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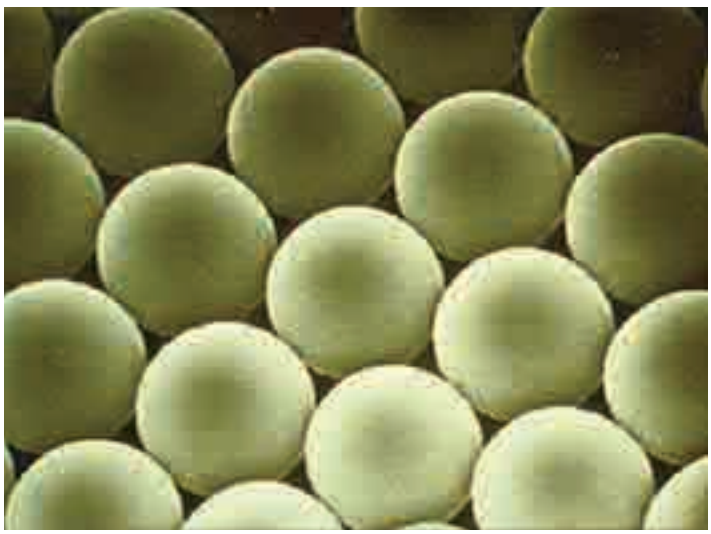
Is there a bug on board?

Phil Duncanson reviews the process of immunomagnetic separation

IMMUNOMAGNETIC separation (IMS) is the process of using small super-paramagnetic particles or beads coated with antibodies against surface antigens of cells. Utilising this technique, methods have been described for the efficient isolation of certain eukaryotic cells from fluids such as blood. Additionally, this technique has been shown to be suitable for the detection of prokaryotic organisms such as bacteria and viruses.



The technique of IMS is assisted in the fact that bacteria immunologically bound to magnetic beads usually remain viable and can continue to multiply if nutritional requirements are provided. The immuno-magnetically-isolated fraction can then be washed to remove non-specifically attached organisms before being placed on suitable growth media. Both polyclonal and monoclonal antibodies have been employed in IMS. These antibodies can be linked to the beads either directly or indirectly, using beads pre-coated with anti-mouse or anti-rabbit antibodies. Several magnetic solid phases in particle form are commercially available for magnetic separation of biological organisms, organelles, or molecules. Common to all of these particles is that specific binding molecules can be attached to them. Most particles are super-paramagnetic; i.e. they are magnetic in a magnetic field but are non magnetic as soon as the magnetic field is removed. This is important because, once separated by a magnet, particles should attach to each other through intermagnetic force but then return directly back into suspension. Physical parameters, i.e. the shape and size of the particles, are also important. In order to perform identically in a suspension, with respect to sedimentation and kinetics of binding to other molecules, identical size and form of the particle are preferred.

The IMS technique has several advantages for micro-

biologists. When working with samples heavily contaminated with non-target organisms, IMS facilitates the purification of the target organism. Additionally, larger volumes of samples can be employed and captured target organisms can be concentrated to a volume suitable for analysis. Isolation of specific bacteria by the antigen-antibody reaction has generally been accomplished by inoculating the bead samples to cultivation broths or onto solid media selective for the target bacteria. Identification can then be accomplished by routine or conventional methods. However, increasingly IMS is being chosen as a precursor to a number of downstream detection methods. These methods whilst using very different technologies all serve to answer the question *'is there a bug on board?'*

There are an increasing number of methods downstream of the IMS process to confirm the presence of target microorganisms. We will examine some of the more common ones:

The first application of IMS technology to microbiological science was the separation of bacteria from other non-target organisms for delivery to liquid or solid culture media. Bacteria do not need to be detached from the beads, as attachment apparently has no effect on their growth. Both solid and liquid media have been used for cultivation of several bacterial species immunologically bound to magnetic beads, however, enumeration of CFU must take into account that each colony is not always the product of a single cell; several cells might be attached to a cluster of beads to initiate a single colony. Despite this, IMS has been shown to be a quantitative technique and enumeration of CFU correlates to the initial inoculum.

Both intact bacteria and their soluble antigenic determinants can be detected after magnetic extraction from the test sample, using a second antibody in a sandwich format. The application of this technology performed on an automated platform (BeadRetriever™, Dynal Biotech Ltd.) was recently applied to the rapid detection of a *Salmonella enteritidis* outbreak at a bakery (Duncanson *et al.*, 2003).

Bead Retriever automated IMS platform from Dynal Biotech Ltd

The ability of Polymerase Chain Reaction (PCR) to amplify specific DNA elements drastically reduces the need for the large quantities of test material. In theory, one copy of the target gene is sufficient for successful amplification. In many ways, the extreme sensitivity of PCR can be compared with cultivation of bacteria on non-selective media, when a single live bacterium can be detected upon initiation of a single colony. However, certain disadvantages limit the technique for diagnostic use. The sample volume traditionally used in PCR ranges from <1 to 20µl. For several microbiological applications, such as testing for *Salmonella* spp. in foods, requirements are often one cultivatable organism per 25g of sample. Reduction of the sample to <1 to 20µl restricts the test sensitivity to a theoretical minimum of 5,000 to 100,000 organisms per ml. An additional factor hindering the diagnostic use of PCR directly is the sensitivity of the *Taq* polymerase to inhibitor elements in the sample.

The use of IMS as a pre-PCR step appears to solve several of these problems. The bacteria in the sample are concentrated to a suitable volume of 10 to 100µl, and specific *Taq* polymerase inhibitors are simultaneously removed. Furthermore, there have been several reports of surveys examining the application of PCR to diagnostic microbiology that have concluded that IMS is essential to increase sensitivity and reduce inhibition. These have included the detection of *Listeria* from ham samples (Hudson *et al.*, 2001), *Salmonella* from alfalfa seed homogenates (Liao & Schollenberg, 2003), and MRSA from clinical samples (Francois *et al.*, 2003).

Dynabead with bacteria attached to the surface

While there have been many IMS methods and particles for various pathogens described in the literature, several are available commercially. For example, Dynabeads® anti-*E. coli* O157 for the physical selective enrichment and improvement in the sensitivity and specificity of the conventional culture method. Whilst Dynabeads® anti-*Cryptosporidium* kit is an integral part of US EPA Method 1622 and UK DETR Water Supply Regulation 1999 SI No. 1524 for the detection of *Cryptosporidium* from potable water samples.

It has been well-described in the literature that DNA amplification, nanotechnology and lab-on-a-chip diagnostics may all have a role to play in the future of diagnostic microbiology. Whilst much of the investment in research has focused on the end-detection techniques, little work has been focused on the sample preparation. If these novel techniques are to provide answers comparable to current result reporting such as presence/absence of a pathogen in 25g of food then efforts are needed to concentrate and deliver these pathogens to a test system. It is in this area that IMS excels.

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Education in Ethiopia

In the third in a series of articles, **Dr Jenny Search** reports on her continuing two-year voluntary service overseas placement at Debub University in Ethiopia

RECENTLY I ATTENDED THE 24th African Health Sciences Congress which this year was held in Ethiopia. The venue was the very impressive African Union Conference Centre in Addis Ababa. The plenary session room was where they hold the African Union meetings and had country nameplates around the room. I would have sat at UK but the view of the screen from there was terrible so instead I opted for the prime viewing spot allocated to Burkina Faso! For each country there were headphones for translation, microphones and voting panels.

There were no translation facilities at this meeting but you could listen to the presentations through the headphones. Cameras projected the speaker onto large screens throughout the talk and if a question was asked the cameras automatically centred to the microphone which had been turned on!

One of the organisers told me that 400 delegates had registered but I don't think that many were present. Most attendees seemed to be from Ethiopia and Kenya although I did meet people from all over Africa and there were some scientists representing the WHO. The two major symposiums were *'HIV/AIDS, STD and TB'* and *'Malaria and other vector borne diseases'*. There were several smaller symposia including: medicinal plants, nutrition and health, sexual and reproductive health and viral and bacterial diseases.

The plenary talk was given by Dr Macharia from CDC-Kenya. She summarised the current status of anti-retroviral therapy (ART) in Africa. In Sub-Saharan Africa, 30 million people are infected with HIV which is 70% of HIV-infected people worldwide. However only 1% of those who need the drugs, are able to afford ART. During the discussion it was pointed out that efforts should not only be focused on ART, especially as resistance will develop. Other factors such as a nutritionally balanced diet can be just as important.

One of the most heated debates followed a talk given by Amiri Rajabu from Tanzania. His talk was essentially very simple, he presented some interesting statistics: 3.2 million children under the age of 15 are infected with HIV and 800,000 of them are newly infected (i.e. became infected after birth). Adolescents begin sexual activity between the ages of 9 to 16. He had run workshops in schools where adolescents had told him they

Further Information

- This is the third in a series of reports from Jenny. You can find out more about her activities and see some more photos at www.neal-jenny.info
- For more information about VSO, see www.vso.org.uk.
- The Faculty of Natural Sciences at Debub University also has a website at http://home.no/dufns

want to protect themselves from STDs such as HIV but they couldn't use condoms because they are too small. The speaker then asked the audience whether we should provide condoms in different sizes in order to accommodate everybody. Some agreed with the speaker that if it was a choice between condoms or HIV then such protection should be provided for school children. Others thought condoms should only be given as a last resort and people should be encouraged to abstain from sexual activity; condoms should only be the last resort. Yet another opinion was that as condom usage has not been successful in adults, why should we expect it to be effective for adolescents? The talk caused quite a stir and the arguments continued over the lunch table.

The other sessions provided equally interesting topics. We heard about plant extracts which show anti-*Plasmodium* activity, a grass pea (*Lathyrus saivus*) which is very resistant to drought, disease, pests and water logging but contains a toxin associated with a nervous disorder when the pea is eaten as a large (>30% calorific intake) part of the diet — i.e. during times of drought and famine.

In the virology/bacteriology session Demissie Beyene presented his findings on detection of nasal carriage of *Mycobacterium leprae* in up to 6% of healthy individuals in an Ethiopian village. He suggested transmission of sub-clinical infection of *M. leprae* may account for the consistent number of leprosy cases annually diagnosed despite effective drug therapy. The Ethiopian Health and Nutrition Research Institute (ENHRI) reported the status of bacterial diarrhoeal diseases in relation to vulnerability to epidemics and droughts in Ethiopia. Maranga Wamae from the Kenya Medical Research Institute (Kemri) told us of the initiation of a network for surveillance of pneumococcal disease in the East Africa Region (netSPEAR). Its aims are to promote routine surveillance for *Streptococcus pneumoniae* in seven countries in East Africa.

The meeting was an excellent opportunity for me to discover some of the research taking place in this area of the world. It is difficult for me to gain access to recent research results. At present the University does not subscribe to any microbiological journals and the Internet access is frustratingly slow at best and non-existent at other times. I also made many contacts with researchers interested in forming collaborations with Debub University. Due to the lack of equipment here, I think the best way we can start a successful research programme is by forming such links with other better-established institutions.

Back in Awassa and the new academic year has started. The third year biology students had to choose a "unit" in which to specialise. This year we only have the capacity to open two units (out of five) and asked the students their choices. I am pleased to report the Microbiology and Parasitology Unit was the second most popular unit (after Ecology and Environmental Sciences).

I am teaching a cell biology course to all the third years and an immunology course to students in the microbiology unit. I am having a really hard time trying to develop some practical experiments for these students without any sources of antibodies and antigens. I am reluctant to use human blood due to the risks involved with HIV etc. and am consulting with some local clinics to see if they can help.

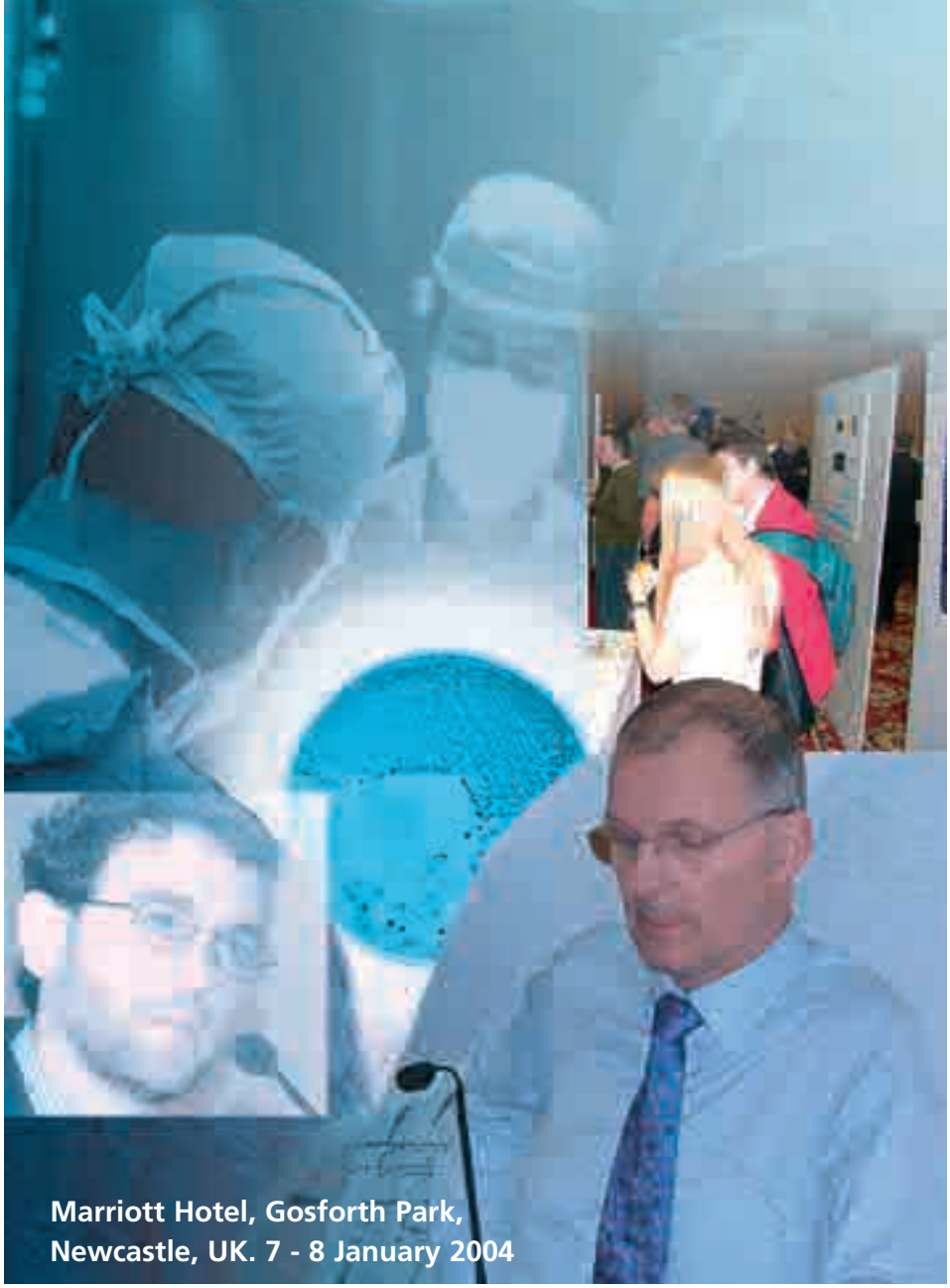
There are some things that I suspect are easier to get hold of here than in the 'west.' I asked at a clinic if it would be possible to take some blood films containing malarial parasites to use in a practical class. When I returned the microscopist gave me seven positive films he had saved for me in one morning!

Jenny Search
Debub University, Ethiopia

Microbial Interactions with Medical Devices:

a matter of life and death

Susannah Walsh reports on the 2004 January meeting



Marriott Hotel, Gosforth Park, Newcastle, UK. 7 - 8 January 2004

THE JANUARY 2004 Winter Meeting covered a wide range of topics presented by microbiologists, chemists and physicists. Overall the meeting was very successful with the topic getting lots of interest and with a high quality of presentations and poster displays. The new format of the meeting and the 'hotel' location were also appreciated by all the delegates.

The Introductory session comprised 4 presentations and was chaired by **Susannah Walsh** (De Montfort University, Leicester). **Peter Gilbert** (University of Manchester) started the meeting with a broad introduction to *'surfaces and adhesion'*. He stressed that in nature and diseases, bacteria are usually found associated with surfaces and growing as biofilms, rather than in a planktonic form. He went on to describe features of the microenvironment produced by a biofilm's extensive extracellular matrix. It was explained that in nutrient rich and relatively exposed situations such as the gastrointestinal tract, mouth and urinary genital tract, biofilms are comprised of numerous genera, whereas within the confines of tissues, biofilm infections are generally monocultures. Peter then discussed and reviewed the various mechanisms that are associated with the survival of 'persisters' within biofilms. He finished by giving examples of how infections can occur if the host is damaged by trauma, surgery or disease, displacing commensal organisms from colonised mucosa to the underlying tissues. The implantation of medical devices was named as a major risk factor and the resistance of biofilm-associated bacteria to host immune defences and antibiotics was highlighted.

Matteo Santin (School of Pharmacy and Biomolecular Sciences, University of Brighton) followed with a talk on *'surface conditioning and microbial adhesion'*. He explained that the inevitable contact of an implanted medical device with body fluids induces the immediate adsorption of proteins onto the material surface and described how this is affected by the physico-chemical properties of both the surface and the protein, as well as by the composition of the body fluid in which the protein is dissolved. His presentation questioned the validity of two approaches: (1) reducing the attachment of microbial cells by producing surfaces which are relatively inert towards protein adsorption and (2); engineering devices able to release anti-microbial agents in the

Matteo Santin

surrounding biological environment. The ability of the surface conditioning protein film to promote infections was analysed in different scenarios and the bacterium species-specific response of biomaterials was described.

Roger Bayston

Roger Bayston (School of Medical and Surgical Sciences, University of Nottingham) gave a presentation on *'antimicrobials and implantable devices';* notably on catheters. He started by describing the scale of the problem with emphasis on the seriousness of many infections and the cost to health resources. The Categories of catheter were explained along with their relative risks and sources of contamination. Roger commented on the diminished role of antibiotics in the treatment of such infections, as the causative organisms grow as biofilms making them insusceptible (but not "resistant" in a conventional sense) to therapeutic concentrations. Finally he discussed the attempts, both successful and unsuccessful, to prevent infections by coating the catheters with antimicrobials such as antiseptics, silver compounds, or antibiotics.

Finally, to end this first session, **Mark Wilcox** (School of Biochemistry and Molecular Biology, University of Leeds) discussed *'antimicrobial intravascular catheters which surface to coat?'* His presentation reviewed studies comparing Minocycline-rifampin (MR) and chlorhexidine silver sulphadiazine (CSS) containing catheters, commenting that the significant difference in favour of MR was probably due to the fact that these have antimicrobial coatings on both the outer and inner surfaces, whereas only the outer surfaces of CVCs were coated with CSS. However, both studies concluded that use of such catheters was likely to be cost-effective, and one found significant protection against catheter-related bloodstream infections when the incidence of infection was at least 3-4 per 1000 catheter days. Mark described the limitations of testing methods for catheter infection and concluded that coating of both surfaces was preferable to just one, as microorganisms are often associated with both surfaces during use.

Mark Wilcox

The next session chaired by **Peter Gilbert** focused on Ophthalmic and Dental/Oral Devices. **John Dart** (Moorfields Eye Hospital, London) began this session with a talk on *'biofilm related infections in ophthalmology'* and described biofilm-related infections of the eye with the aid of some informative but graphic photographs. He gave an overview of corneal infections in daily wear contact lens users, illustrating how organisms such as *Ps. aeruginosa* can be passed from lens cases to the eye. Late intraocular lens related endophthalmitis causing an indolent relapsing infection localised around the implant and lens capsule was described. The causative organisms are of low virulence (*P. acnes*, corynebacteria and *S. epidermidis*) and, like biofilm-related infections elsewhere, they respond poorly to conventional antibiotic therapy. Lastly, John talked about infectious crystalline keratopathy, a unique biofilm-related infection in which pathogens, typically *S. viridans*, grow between the corneal lamellae without exciting an inflammatory response.

Pit Vermeltvoort (Department of Biomedical Engineering, University of Groningen) followed with an excellent account of *'bacterial adhesion and transmission associated with contact lens use'*. She started by describing keratitis associated with contact lens wear and went on to explain how bacteria adhere to the lens surface during handling and are then passed to the eye. She described how studies conducted in Gerda Bruinsma's research group have investigated the transmission of *Ps. aeruginosa* and *S. aureus* from contact lenses to surfaces with different hydrophobicity and roughness. Three types of lenses were contaminated and put on a glass, polymethylmethacrylate or silicone rubber substratum surface, shaped to mimic the eye. After 2 and 16 hours, lenses were separated from the surfaces and the number of bacteria on the respective surfaces was determined in order to calculate the percentages of transmission. Bacterial transmission after two hours of contact varied between 4 - 34% for *P.aeruginosa* and between 6 - 39% for *S.aureus*, depending on the combination of lens and substratum surface used. After sixteen hours transmission rates of *P. aeruginosa* varied from 17 - 70 %, while rates of *S. aureus* varied from 12 - 35%. Pit concluded that transmission percentages of *P. aeruginosa* were significantly higher after sixteen than after two hours, while less time dependence was seen for *S. aureus*. Additionally, it was shown that the substatum surface underneath the lens influences the amount of bacterial transmission.

Carol Morris (Diagnostic Lens Strategic Business Unit, Cibavision Corporation), our first speaker from the US, concluded the ophthalmic session with a presentation on *'in vivo bacterial adhesion to different contact lenses'*. She described how bacterial contamination of contact lenses has been demonstrated in asymptomatic contact lens (CL) wearers and the unclear relationship of this to infection and inflammation. She then presented data on the bacterial contamination rate of contact lenses, looking at the issues of different wear modalities (e.g. daily wear, extended wear), length of wear in extended wear, different materials such as (polyHEMA, HEMA/methacrylate, silicone hydrogels etc.) and different wear sites (even countries). She related the data produced to published data on microbial keratitis rates and among other findings, it appeared that length of wear, even up to 30 nights, does not increase the bacterial contamination rate.

Hillary Lappin-Scott

Two presentations on dental/oral devices' issues were given by **Hillary Lappin-Scott** and **Gavin Pearson**. Hillary (Biological Sciences, University of Exeter) started this session by introducing the audience to the *'attachment and dynamics of biofilm formation by oral bacteria'* by describing the complex community of micro-organisms that reside in our mouths, and commented on how resident flora can decrease the infection risk by competition. Her presentation then described methods for studying the oral community via models and more direct methods such as density gel electrophoresis. **Gavin Pearson** (Queen Mary's School of Medicine and Dentistry, QMUL) concluded this session with a talk about *'photoactivated disinfection in caries and endodontics'*. His presentation started with a description of the process behind the formation of dental caries and highlighted the difficulty in getting rid of bacteria from dentine. The results of studies, investigating the antibacterial effects achieved with photo-activated disinfection (PAD) were then discussed. The application of medical grade tolonium chloride followed by illumination with laser light at 635nm has produced highly selective bacterial kills. The studies have measured bacterial kill levels in planktonic solutions, collagen matrices, extracted teeth and *in vivo* carious and endodontic lesions. Assays demonstrated kill rates up to 9 log reduction in CFUs/ml in the planktonic model. *In vivo* studies culturing both carious lesions and also root canals before and after application of PAD have showed that kill levels obtained in the laboratory may also be achieved in the oral cavity. These results suggest that current methods of treatment of dental disease may be modified. The need for total excision of the lesion will be reduced and micro surgical approaches will offer better prognosis for tooth survival. Before the tradeshow reception and society dinner, **Jean-Yves Maillard** was introduced by the President, Dr Peter Silley, to give the **W H Pierce Memorial Prize Lecture** on *'biocides'*. (A synopsis of his lecture can be found on page 14).

The next day started with a session on New Technologies and 'SMART' surfaces, chaired by **Valerie Edwards-Jones**. **Mike Thompson** (Department of Chemistry, University of Toronto) began

Jean-Yves Maillard

this session with a presentation on *'detection of microbes and biomolecules at the liquid-solid interface by acoustic wave sensors'*. Mike described the use of transverse shear wave physics in the study of the chemistry of surface-attached cells, nucleic acids and proteins and their interactions with small molecules. This offers a highly sensitive format for the detection of biomolecular interactions, especially when performed employing the flow-injection technique. A number of examples of use of the technique were presented including sensor detection of nucleic acid probes for microbes, RNA-peptide-drug and transcriptional chemistry. The results of the work indicated that not only can detection be achieved but that acoustic physics also provides information in terms of structure, such as conformational shifts. The presentation finished by looking to the future with a comparison of the sensitivity of acoustic physics with the better-known surface plasmon resonance spectroscopy.

The next presentation was given by **Joanna Verran** (Department of Biological Sciences, Manchester Metropolitan University) on *'atomic force microscopy and surfaces'*. Joanna described the use of atomic force microscopy (AFM) as a powerful tool capable of imaging surfaces at nanometer or sub-nanometre resolution. She explained how the process works to build up a three dimensional image of a surface allowing ambient imaging of a surface from the macroscopic scale to the molecular level without the need for any additional surface preparation. The presentation concluded that although it can be technically challenging to get a good image, there is considerable potential for AFM to contribute to information obtained on the characterization of materials used in medical devices.

Andrew Lloyd (School of Pharmacy and Biomolecular Sciences, University of Brighton) followed with a presentation on *'biomimetic surfaces to reduce bacterial adhesion to medical devices'*.

Peter Gilbert

Andrew described the various studies undertaken at the University of Brighton evaluating the adhesion of *Ps. aeruginosa*, *S. epidermidis* and *S. marcescens* to novel biomimetic PC-based polymers and polymeric coatings and the effects of surface conditioning with various biological fluids on the adhesion patterns over time for various medical device applications. PC-based biomimetic materials were shown to offer the potential to reduce bacterial adhesion to a wide range of medical devices. The ability to formulate a wide range of both polymers and polymeric coatings offers the opportunity to engineer biomimetic

polymers for any specific medical device application.

After tea and coffee, **Sean Gorman** (School of Pharmacy, Queens University Belfast) continued with a talk on *'novel silicone-based materials with antimicrobial properties'*. Sean explained the advantages (low risk of unfavourable biological reactions, favourable patient comfort) and disadvantages (surface formation of a highly resistant microbial biofilm, lack of inherent lubricity and its high coefficient of friction) of silicone use in medical devices, and then described how significant reductions in these complications may be realised with the development of novel silicone materials. The drug delivery potential of this silicone platform technology was discussed.

Martin Buggy (Department of Materials Science and Technology, University of Limerick) ended this session by presenting a talk on *'polymers for medical device applications'*. He

Viewing the posters

reviewed applications of polymers in medical devices and demonstrated that development of new polymers tend to be incremental, with manipulation to achieve the desired properties for particular applications. Martin reviewed current trends and technologies associated with orthopaedics and cardiovascular devices including the redesign of joints with ultra hard bearing surfaces, biomimetic designs to simulate cartilage and replacement bone cements that cure without giving off heat. Finally, the effects of sterilisation on the properties of polymers used in implants are discussed and the consequences for material-cell interaction were highlighted.

Trade Show Exhibitors

The new technologies session was followed by two high quality offered papers. The first was given by **Claire Edwards** (University Hospital Medical School, University of Nottingham) *on 'Staphylococcus aureus biofilms: the effect of growth conditions and a virulence regulator gene mutation on biofilm formation'*. Claire described how the development of biofilms by GFP-labelled *S. aureus* has been explored using a flow cell system in combination with scanning confocal laser microscopy and image analysis to accurately provide quantitative data in real-time of biofilm formation. Her results showed that a *S. aureus* mutated in a regulatory locus, previously reported to be attenuated in virulence in an animal infection model does not form biofilm in the same way as wild-type *S. aureus*, and that reduction in biofilm forming ability cannot be explained in terms of deficient initial adhesion to the substrate.

The second offered paper on *'biocide incorporated drawn polymers as medical devices with control release capabilities'* was presented by **Sofia Iconomopoulou**. She described an attempt to develop polymeric matrixes with triclosan-controlled release, by incorporating the biocide into polymers that have been subsequently uniaxially drawn. The release rate was shown to be controlled by the draw ratio or in other words by the molecular orientation. She concluded that, the molecular orientation is a significant parameter for both the control release and the polymers mechanical properties improvement.

The final session of this meeting concentrated on Trigger Systems: release of antimicrobials and was chaired by **Peter Silley,** SfAM President. **David Stickler** (Cardiff School of Biosciences, Cardiff University) started the session by talking about *'controlled release of antimicrobials from medical devices'*. David concentrated on his specialist area of urinary catheters as examples of devices. He emphasised that conceptually it seems easiest to just load up the device with antimicrobial, but the control of its release is very important. Although some materials have shown promising activity *in vitro*, relatively few prosthetic devices manufactured from or coated with these materials have achieved unequivocal success in preventing device-associated infection in clinical practice. He suggested that with the benefit of hindsight it was perhaps naive to imagine that merely incorporating antimicrobials into biomaterials would frustrate the surface colonisation mechanisms that microbes have evolved over millions of years as basic survival strategies. However, he also described a recent study where filling the balloon of a urinary catheter with biocide was shown in a model system to inhibit biofilm formation.

The final talk was given by **Paul Williams** (Institute of Infection, Immunity and Inflammation, University of Nottingham) on *'controlling infection by tuning in and turning down the volume of bacterial small-talk'*. Paul described how the attenuation of virulence of infecting organisms is now being targeted for rational drug design. The discovery that bacterial cells communicate using small diffusible signalling molecules to regulate virulence gene expression and biofilm development in concert with cell population density (termed quorum sensing) offers such a target.

Ths meeting was brought to a close by the SfAM President **Peter Silley**, who praised the quality of all of the presentations and thanked all of the speakers for making the meeting a success. The meeting was very enjoyable and demonstrated a range of approaches and applications of technology to the challenges of medical device contamination. It was particularly helpful to have scientists from many specialties brought together to share their knowledge and expertise. Hopefully, this will lead to more cross-discipline meetings as a result.

Susannah Walsh
DeMontfort University, Leicester

Students into Work report

The Society offers FULL members an opportunity to give undergraduate students of microbiology the chance to obtain work experience during the summer vacation. 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.

The influence of shear on bacterial diversity in freshwater biofilms

LAST SUMMER I HAD THE good fortune of receiving a SfAM student into work award under the supervision of Professor Peter Gilbert and Dr. Alex Rickard at the University of Manchester. During the ten weeks I investigated the microbial diversity and frequency of occurrence of coaggregation between community members of freshwater biofilms grown under extremes of shear force.

Biofilms were grown in a rotating biofilm bioreactor, fed with unfiltered potable tap water, in which the substrata comprised rotating concentric stainless steel rings. The magnitude of the shear-force generated depended on the radius of the steel ring, i.e. the smaller the radius the lower the shear force. My work entailed sampling the biofilm associated with each ring, isolation purification of the morphotypes represented and characterization of their co-aggregation potential. Identification of the dominant morphotypes followed extraction of the DNA and PCR-amplification of the 16s rRNA genes.

The PCR products were purified and sequenced so that the species could be identified by the DNA sequence coding for its 16s RNA. This allowed a comparison of general trends in composition of the biofilms depending upon the imposed shear force. The interactions of the bacteria in each biofilm were investigated by coaggregation assays. The results will be analysed in the next few months but a preliminary analysis of the data suggests that the imposed shear-force profoundly influences both community composition and diversity, as well as the proportion of coaggregating organisms. Under high shear the biofilm community was less diverse and contained many bacteria belonging to novel genera. Those biofilms formed under low shear were considerably more diverse and the community members often did not co-aggregate. This suggests that under high shear conditions the ability to colonise a surface is more dependent upon cell-cell adhesion phenomena than under low shear.

I found my SfAM work placement to be an extremely enjoyable and valuable experience, which has taught me many useful skills that will aid me greatly in my final year project and future employment. It has also led me to a greater appreciation of scientific research work and has inspired me to apply for a Ph.D. when I complete my degree.

Many thanks to the Society for Applied Microbiology for providing me with such a great opportunity, and to all of my friends and colleagues in the lab for their help and guidance.

Amy Stead
University of Manchester

The President's Fund Reports

Once again, our members report on the use they have made of a **President's Fund** grant to attend a variety of meetings and conferences around the globe. To find out how ***you*** could benefit from this valuable award check out the panel or visit our website. This is the last series of reports that will be published in *Microbiologist*. From now on, as the President has reported on page 8, recipients of the award will be required to write an article for the magazine on a subject to be agreed with the Editor.

Biofilms 2003

1 - 6 November, Victoria, BC, Canada

Greeted by temperatures of 3°C and strong winds which reduced it further, we arrived in Vancouver for the onward trip to Victoria, BC to attend the Biofilms 2003 conference arranged by the American Society for Microbiology. This hugely popular conference drew over 600 delegates from more than 30 different countries and included 70 lectures and 13 evening sessions, as well as 369 poster presentations over four days. Held in the purpose-built Victoria Conference Centre, only a stone's throw from the picturesque harbour and surrounded by many excellent opportunities for dining, the meeting was very well situated.

The conference opened on Saturday evening with a valedictory lecture from **Bill Costerton** — widely regarded by many as the world leader in biofilm research. Other leaders in the field, including former SfAM committee member, **Professor Hilary Lappin-Scott**, gave a review of Bill's career and paid personal tributes to him.

Each day's lectures began at 8:00 am and continued through until the poster session at 4:30 pm, with different aspects of biofilm research being presented each morning or afternoon. Evening sessions were given over to smaller break-out groups, aimed at stimulating debate in more specialised areas and convened by experts in those fields.

Although all presentations were very informative, from a personal perspective and having an interest in methicillin-resistant *Staphylococcus aureus*, several were particularly memorable. **Dr Jeremy Yarwood's** presentation on expression of the accessory gene regulator (*agr*) quorum-sensing system in biofilms of *S. aureus* demonstrated that a reduction in the number of cells by disrupting the *agr* locus in spinning disk reactor biofilms, without any detectable decrease in the biofilm thickness or structure. Expression of *agr* also appeared to precede cell detachment, indicating a possible role in repressing surface adhesion factors or activating expression of a surfactant.

Dr Mark Shirtliff gave a proteomic evaluation of *S. aureus* in biofilms, comparing microarray data with proteomic findings from planktonic and biofilm isolates. Approximately 20% of the proteins produced by *S. aureus* in biofilm growth were significantly different to those when in planktonic growth; increases in certain enzymes were also detected in older biofilms. Several metabolic enzymes and transcription factors were only found when *S.aureus* was grown in biofilms, providing a focus for future work.

'Suppression of medical device-associated staphylococcal infections by the quorum-sensing inhibitor RIP' was presented by **Dr Naomi Balaban**, in which she described how the RNAIII Inhibiting Peptide (RIP) inhibits adhesion by staphylococci to plastic polymers and epithelial cells by disrupting the bacterial cell-cell communication, including antibiotic-resistant strains. Attempts at staphylococcal infection of RIP coated Dacron grafts, following implantation in rats, showed a significant decrease in bacterial load and may have great benefits in reducing the colonisation of prosthetic joints, heart valves and indwelling vascular devices. Additionally, no resistance to RIP was detected and to the contrary, some synergy has been demonstrated with antibiotics which bodes well for combination therapy in the future.

My poster, entitled *'Vancomycin-resistant enterococci — biofilm formation and antibiotic treatment,'* was exhibited during one of the sessions, as were four others from our research group. All were very well received, generating a great deal of thought and discussion, as well as ideas and potential collaboration for further research.

Am I eligible - can I apply?

The President's Fund provides limited grants to ALL members to assist them to attend scientific meetings or workshops related to their area of work. Awards are made at the sole discretion of the Honorary President. Please note that this Fund is open to members of all ages! Why not apply to the Fund? The maximum grant available is normally £1,000.

To apply, visit **www.sfam.org.uk/members/prizes.php**

TERMS & CONDITIONS

1. The applicant must have been a member for at least a full subscription year before the event to be attended and must be a fully paid-up member at the time of application.

2. A successful applicant cannot re-apply to the Fund for three years from the date of the award.

3. Preference will be given to applicants who are contributing to the meeting they wish to attend and/or are unable to obtain funds elsewhere.

4. Completed applications must include an abstract of any intended contribution to be made at the meeting and must be received by the Society Office not less than six weeks before the date of the event.

5. Student member applications must be supported by their supervisor and include the contact telephone number(s) and email address(es) of the supervisor or head of department who is supporting their application.

6. The maximum grant available is normally £1,000.

7. Under exceptional circumstances this maximum may be exceeded.

9. The award of this grant is at the sole discretion of the Hon President of the Society.

10. The applicant must write a short article of between 400 - 600 words within 4 weeks of the meeting, the content of which will be agreed with the Editor of sfam *Microbiologist* and will be published in the magazine. Photographs of the applicant and/or the subject of the article are desirable. These should be supplied as (a) digital files in TIFF or JPEG format 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 to the applicant.

After a long day many delegates adjourned to an 'English pub' nearby to mull over the days presentations and partake in some of the excellent local brews — including a 'dark' lager which tasted better than it sounds – before retiring, ready for the next day's early start.

I was able to meet quite a few of the experts whose names I had frequently encountered as authors and discussed some of their work with them. I also received a valued offer of collaboration with several highly-specialised techniques from one of the field's leading exponents that I hope to be able accept, and which should make rather a nice chapter for my PhD thesis. Finally, I would like to express my sincere thanks the Society for awarding me a President's Fund grant to help me to attend this meeting.

Richard Ebray
University of Exeter

The BCPC International 'Congress Crop Science & Technology 2003'

10 - 12 November 2003, Glasgow, Scotland, UK

The annual event, organised by the British Crop Protection Council (BCPC) was this year held in the city of Glasgow, which is considered to be Europe's fastest growing conference destination. Much attention was given to the three key themes of crop protection, food chain and the environment. The event was impressively well organised, where highly respected and well established scientists from all over the world, were invited to present their research.

The congress was launched with four key note lectures, each focusing on different, yet important subjects for agriculture in the 21st century. **Ian R Crute** (Rothamsted, Research Harpenden, UK) addressed how science is challenged to provide knowledge for alternative and sustainable methods of crop production, based on renewable resources that will reduce the crop yield loss, in order to meet the needs of a rapidly increasing human population. **Peter J Lillford** (Centre for Novel Agricultural Products, University of York, UK) discussed the impact of genomics on the food chain. In this lecture, it was emphasised that the modern food chain involves a complex set of industries and the impact of genomics is not just a simple flow of foodstuffs for 'field to fork'. **Christine M Bruhn** (Centre of Consumer Research, University of California, Davis, USA) raised the issue that in order to meet consumer's demand for food safety, quality and environmental protection, a better communication between scientific organisations and consumer associations is needed. **Dick R Potts** (The Game Conservancy Trust, Fordinbridge, UK) emphasised the problems that biodiversity faces from intensification in order for 50% more food to be produced by the next 30 years. After the end of the lectures, all the delegates were invited to the civic reception, were everybody had the opportunity to meet and discuss with other researchers and exhibitors.

On the second day of the conference, issues such as new compounds, concepts and uses, biotechnology approaches for crop development and quality, and new EU environmental policies and registration of plant protection products were discussed. **J Gressel and Z Amsellem** (Weizmann Institute of Science, Rehovot, Israel) indicated that using transgenic mycoherbicids, an enhanced efficacy of biological control of major weeds in arable row-crop agriculture could be achieved. These workers managed to augment the efficacy of two mycoherbicides i.e. *Colletotrichum coccoides* and *Fusarium arthosporiodes* against *Abutilon theophrasti* and *Orobanche* spp. respectively, by transferring virulence factors to the microorganisms. **G J Bryan** (Scottish Crop Research Institute, Dundee, UK) introduced the current status in genomics and molecular breeding for crop plant improvement, saying that although genomics technology is of major importance, we are still at an early stage of its effective use. **D J Flynn** (Pesticides Safety Directorate, York, UK) discussed issues for the re-registration of plant protection products in Europe. Until recently, the regulatory system was facing difficulties, but now an expert group has been commissioned to look at the possibilities of harmonising deadlines and procedures, to facilitate sharing of the workloads envisaged.

The afternoon saw the poster sessions, where we had the opportunity to present our work on the theme of '*Non-chemical Crop Protection*'. Our poster entitled *'Integrated biological control of powdery mildew and grey mould of cucumber and tomato using Brevibacillus brevis combinations'* was appreciated by many researchers from related fields of study, with whom we exchanged ideas and suggestions for future work.

In the morning of the last day of the congress, there were lectures on *'Resistance: Science into Practice'*, *'Pesticide Residues in Food'* and '*Novel and Industrial Crops: Realising their Potential'* followed by related poster sessions.

The Congress finished with some very interesting lectures in the much debated session of *'Environmental Impact of GM Crops'*, where, invited researchers from UK, Germany, Israel and USA discussed their points of view in this area. **M J Mckee** *et al.*, (Monsanto Company, Ecological Technology Centre, St Louis, Missouri, USA) stated that the adoption of GM products can have direct and indirect benefits for the environment by the replacement of broad spectrum synthetic chemical insecticides and the facilitation of reduced tillage.

Finally, we are grateful to SfAM for providing us with a President's Fund grant to attend our first important congress for our research field.

Dimitrios Dertzakis and Ioanna Lazaraki
Department of Agriculture & Forestry
University of Aberdeen

Biofilms 2003

1 - 6 November, Victoria, BC, Canada

I wish to thank SfAM for their generous award from the Presidents Fund that enabled my participation at *'Biofilms 2003.'* This conference brought together the leading biofilm researchers in the wonderful venue of Victoria, British Columbia. This is the third 'Biofilms' meeting to be held, and the largest yet, with over 600 delegates attending.

The bright (if a little chilly) weather provided an auspicious start to the meeting which also began with an evening of tribute to **Bill Costerton** who gave the opening address on *'Biofilms as ubiquitous, self- assembling integrated and protected multi-cellular communities'*.

Others later acknowledged his unique contribution to the study of microbial life on surfaces; such as **Hilary Lappin-Scott**, **Ron Atlas** and **Niels Høiby**.

Over the week several key themes were addressed in symposia on biofilm structure, antimicrobial resistance and developmental patterns. The development of complex structures within biofilms and arrangement of sub-populations within biofilms was superbly illustrated by **Tim Tolker-Nielsen.** Confocal laser scanning microscopy was used to determine the role of motility and type IV pili in the formation of multi-cellular mushroom shaped clusters. Non-motile bacteria form the 'stalks' while the motile organisms are able to form the caps by climbing the stalks and aggregating at the top.

Emerging areas of interest within the biofilm community such as bioterrorism and cross kingdom interactions also featured strongly. A series of excellent talks were given on the flourishing subject of detachment and dispersal from biofilms. Real-time imaging showed the reappearance of motile cells 'seething' within mature biofilm and then breaking out leaving a void within the cluster.

A total of 13 evening sessions were run over 3 evenings. These were informal in structure but given to much debate. The session on biofilms in human organ systems, chaired by **Pradeep Singh** and **Donna Hill** tackled the issue of which and to what extent infections can be characterised as biofilms. This lead on to a more general discussion of whether the human commensal flora lives as a biofilm, and even if we will ever be able to answer the question 'What is a biofilm?' This topic was also addressed by **Roberto Kolter** in his presentation *'A rose is a rose.. is a biofilm a biofilm?'* Professor Kolter gave an overview of how he and others have attempted to define universal biofilm characteristics using genetics in order to look beyond a biofilm phenotype towards a biofilm genotype.

I presented a poster on 'The effect of saliva on initial attachment rates of oral bacteria', and received some welcome feedback and helpful discussions with many other delegates. Over 300 posters were presented over three evening sessions, each of which was extremely well attended. Once again I would like to express my gratitude to SfAM for their generous funding.

Gillian Cairns
University of Exeter

European workshop on bacterial protein toxins (ETOX)

Prague, Czech Republic
28 June - 2 July 2003

Thanks to the Presidents Fund grant I was able to attend my first international conference near the beautiful city of Prague. The ETOX workshop has now become an international meeting with researchers not only from Europe but also North and South America and Asia. The five-day workshop was divided into seven sessions with the final session focused on the Anthrax toxin. The conference started on Saturday with an opening talk by **Wim Hol** (USA) on the dodecade of research on the Cholera toxin and the Heat Labile enterotoxin, and the progress that has been made through many collaborations in Europe and the USA.

Lead by the enthusiastic organiser, **Peter Šebo**, our mornings started with a jogging session round the local lake, followed by a swim. There were many fascinating and thought provoking talks given throughout the meeting, ranging from how new toxins were found, the array of different ways bacterial proteins have been able to upset the normal balance of cells, use of toxins as a means of antigen delivery to the immune system, immunotoxins for treatment of cancer, and the use of worms to study the actions of toxins.

The two poster sessions also covered a wide variety of topics, where I had the opportunity to present a poster entitled *'Further characterisation of the effect of naturally occurring mutations found in the Campylobacter jejuni cytolethal-distending toxin genes.'* The poster sessions provided a valuable opportunity to meet and discuss not only my own work but that of many other toxin researchers from round the world, this interaction has helped kick-start my PhD studies and collaborations.

A day and a half into the meeting, Dr Peter Šebo took us to the historic city of Prague where were treated to a fascinating guided tour of Prague Castle, the Charles bridge with its famous, St Nicolas' church, the old town square and the town hall with its unique astronomical clock depicting the 12 apostles. This amazing tour ended at *Obecni Dum* (Municipal House) where a traditional Czech dinner was served with a pint of their world-famous pilsner!

Once again I'd like to thank the Society for Applied Microbiology for giving me the opportunity to attend this thought provoking and enjoyable meeting. I'd also like to thank Dr Peter Šebo and his helpers for making the meeting so delightful.

Manal Abu Oun
Dept of Food and Environmental Safety, Veterinary Laboratories Agency, UK

ASM Conference on *Salmonella:* Pathogenesis, Epidemiology and Vaccine development

Alghero, Sardinia
20 - 24 September 2003

The conference began on Saturday with a general lecture on *Salmonella typhi*. The welcome reception followed where there was the opportunity to meet other delegates from a variety of different background and discuss current research.

Extremely interesting talks were given by **Awa Aidara-Kane** from Switzerland on WHO initiatives on global foodborne salmonellosis surveillance. She described the high burden of salmonellosis in the developing countries, the emergence and prevalence of antimicrobial resistance, and the aetiology behind it.

The next session was on the pathogenesis of *Salmonella.* An enlightening lecture was given by **Dr. McCormick** (USA), who described the molecular pathogenesis of *Salmonella Typhimurium* induced enteritis, which is characterised by movement of electrolytes and water in addition to polymorpho-nuclear neutrophils (PMN) into the intestinal mucosa and lumen from the underlying vasculature.

The following day involved sessions on host adaptation and bacteriophages. **Dr. Wallis** (UK) gave an interesting talk on the molecular basis of *Salmonella*-serotype host specificity. His investigation led to the identification of several new pathogenicity islands and demonstrated that *S. Typhimurium* uses a variety of virulence genes in different animal species, which might result in

implications for the design of effective vaccines against *Salmonella* infections.

Two hours were allocated each day for poster presentations and that was really helpful as it gave delegates the opportunity to discuss their research and subsequently broaden their knowledge in their area of expertise. I presented two posters on research carried out by myself and Anthony Hilton (Editor SfAM *Microbiologist*) on the adaptive resistance to biocides and cross-resistance to antimicrobial agents in *Salmonella enterica* in addition to the mechanisms underlying adaptive resistance. We concluded that the increased cell surface hydrophobicity and the presence of an active efflux pump could facilitate the acquisition of antibacterial resistance in *Salmonella enterica*, providing cross-resistance to a range of antibiotics and biocides.

I had the most brilliant time in Alghero, which is such a beautiful little town. I had the opportunity to meet so many interesting people and finally put faces to the names of people I've read about in journals. I am really grateful to SfAM for giving me the opportunity to attend this prestigious meeting!

Maria Braoudaki
Aston University

Biofilms 2003

1 - 6 November, Victoria BC, Canada

I would like to thank SfAM for offering me the opportunity to travel to this meeting, although I do have a minor quibble with them about the artic temperatures! With over 600 national and international delegates attending, the conference centre situated in the city centre and overlooking the harbour, was the perfect venue to allow students to comfortably mingle with the stars of the show including **Bill Costerton**, **Paul Stoodly** and **George O'Tool**.

I was fascinated by many of the presentations and was particularly interested by Luanne **Hall-Stoodley's** suggestion that Mycobacteria exhibit evidence that they form intracellular biofilms within the host in order to evade immune response. I was especially taken by **Roberto Kolter's** lively performance on the underlying common principals of biofilm formation.

His contagious enthusiasm for microbial biofilms reverberated around the room. **David Davies** also treated us to an exciting presentation which included images of GFP expressing *Pseudomonas aeruginosa* biofilm clusters. Although from the outside, this was nothing exceptional, SCM revealed that the insides were bursting with motile cells which had converted to the planktonic phenotype and were wriggling about and squeezing out to freedom through fractures in the surrounding biofilm.

My own poster presentation entitled: *'Differential Gene Expression in planktonic and biofilm cells of Pseudomonas aeruginosa and Stenotrophomonas maltophilia,'* provided the opportunity for me to meet with other scientist working in this specific area and to discuss my research. Social events were organised throughout the course of the conference to allow delegates to meet and talk in a more relaxed, less formal atmosphere. Attending the conference was great fun and an invaluable experience from a young scientist's point of view.

Marie Lewis
University of Exeter

Symposium on genomics and the meat industry

Paris, France

The theme of this symposium was the impact of genomics and genetic engineering on the meat industry. The conference enabled decision-makers and managers in the industry to discuss developments in this field and possible implications for their companies. The conference opened with an introduction from the INRA (Institut National de la Recherche Agronomique) chairperson **Christian Valin**, followed by a presentation of another member of the INRA, **André Eggen** on basic genomics and its tools. Dr. Eggen discussed how a genotype can explain a particular phenotype, and the importance of understanding the molecular architecture of naturally occurring domestic variations. The subsequent conference presentations covered a wide range of areas including the contribution of genomics to genetic engineering, the hopes and fears for the meat industry and ethical issues. **Stephen Moore** (University of Alberta, Canada), outlined how the new DNA marker technology can be applied in cattle breeding lines but used alone will not replace current breeding strategies. An interesting discussion which closed the first day of the conference was lead by Gerard Raphael Larrere from INRA, on the conflicting views of those who support genetic engineering and those who fear it. He highlighted how these fears are the mirror image of the hopes of those who see it as the solution to all our problems.

The second day of the conference concentrated on the contribution of genomics to livestock breeding, including pigs, ruminants and poultry and to the qualitative characteristics and value of meat, including pigs and cattle. A presentation from **Patrick Cunningham**, (Trinity College, Dublin) discussed the contribution of genomics to traceability systems. The principles of operation in the DNA traceback system, the contribution of statistical analysis to this process and the importance of consumer trust in the meat industry and how the meat industry attempt to address the consumers needs were highlighted. Another speaker, **Mohammed Koohmaraie** (US Department of Agriculture), gave an interesting talk on how genetic selection can be used to improve beef quality and carcass composition. He described the economically important beef traits and how they can be measured, how marker-assisted selection and functional genomics can be used to breed animals that excel in expression of economically important traits and how industry can implement these methods.

I am in my final year of my PhD and although my project is not strictly related to the topics that were discussed during the symposium, it gave me a valuable opportunity to gain an insight into the challenges faced by genetic engineers in the meat industry. I spent the weekend in this beautiful city and I was very impressed by the many Parisian attractions. The Eiffel Tower sparkling at night was just amazing! I would like to thank SfAM for funding my attendance at the conference and also to thank the organisers, Nils Beaumond and Mylene Sookahe for making the conference so enjoyable.

Teresa Catarame
The National Food Centre, Dublin, Ireland.

Bioinformatics and Genome – Current Perspectives

Edited by Miguel A Andrade
Horizon Scientific Press
Price £80.00
Reviewed by Stuart C Clarke

This book was published earlier this year and is one of the large series of books from this publisher on microbiology, genomics and bioinformatics. After an interesting preface in the form of a moral story, this book aims to provide an overview of some of the many aspects of modern bioinformatics, particularly in relation to whole genomes. It consists of twelve chapters written by experts in fields such as genome analysis, gene expression, protein sequence alignment and database development.

The authorship is limited to Europe and Mexico and this I found quite strange. Each chapter is well-written and laid out in an accessible format even when describing complex issues. The chapters are also well-referenced but not over-cited. Table and figures are included where relevant and some of the latter are in colour. Some chapters, such as that on multiple alignment databases, provide an overview which can be used for easy reference whilst others are more specialist and go into much greater detail. However, each chapter stands alone as there is no obvious link throughout the book although this is not necessarily a criticism, more an observation.

One criticism, although, is the over specialist nature a few chapters provide which takes away the general readership. The book ends with a similarly interesting chapter, contributed to by all authors, on the future of bioinformatics which raises some interesting questions. This book will appeal to those with a general interest in bioinformatics or those who are new to the subject but who already have some good knowledge of molecular biology. However, being priced at £80 may limit its market in this respect although this is a usual price for such a specialist text. It is unlikely that it will be used as a reference text by bioinformaticians but will, as the book title suggests, provide a current update to the subject.

Federal Bodysnatchers and the New Guinea Virus: Tales of People, Parasites, and Politics

Robert S Desowitz
W W Norton & Company; Hardcover
224 pps; ISBN 0393051854
Price: £19.95 ($24.95)
Reviewed by Andrew Sails

In the introduction to Robert Desowitz's latest book the author begins by asking the reader the question: "Are we, the top macroscopic animal, still in bondage to the microscopic world of pathogenic creatures?" In an attempt to answer this he takes the reader on a journey through both time and place to examine some of the most pressing issues in infectious disease in the world today. In this entertaining set of essays Desowitz is a supreme storyteller as he engages the reader with his own unique and witty style.

The book begins with the story of the recently re-emerged pathogen, West Nile Virus (WNV). It starts with the first recorded case in Uganda in 1937, through to the experimental treatment of moribund cancer patients in New York in 1950, ending with the virus's New York epidemic debut in 1999. What follows is a cautionary tale of the investigation of the New York outbreak, which retrospectively can be best described as "a shambles". The series of blunders and wrong turns made by many of the investigating "expert" authorities makes most frightening reading. The time delay in linking the epidemic of dying birds to the epidemic of dying people seems almost shocking. The final correct identification of the viral pathogen responsible came not from the medical epidemiologists or microbiologists but from the dogged persistence of the Bronx Zoo's chief veterinary pathologist. The author then concentrates his attention on other arthropod-borne infections and their treatment and control. He describes how the insecticide DDT "turned from saint to sinner" and argues strongly for its usefulness in the control of "the spineless bloodsuckers" responsible for the transmission of a plethora of viral, bacterial and parasitic infections to humans. The narrative then shifts to malaria which globally remains a very significant cause of morbidity and mortality with an estimated 300 million cases and 3 million deaths attributable to it every year. In "malaria millions" Desowitz tells the story of the continuing search for new treatments for malaria as the causative organism becomes resistant to previously effective therapeutics. Towards the end of the chapter he raises two questions firstly, "where will the money come from to bring new successful therapeutics to market?" and "where will the new classes of anti-malarial drugs come from"?

Desowitz argues that alternative strategies such as new impregnated mosquito nets and better understanding of mosquito behaviour may be more effective than spending many more millions on vaccine research.

In the peculiarly entitled chapter "The curious case of the wake-up-from-dead drug and the bearded lady" the reader follows the convoluted history of development of eflornithine hydrochloride (DFMO) as treatment for trypanosomiasis or sleeping sickness. DMFO was originally patented as a drug with the potential to induce abortion and to reduce the size of enlarged prostate glands. However it then makes the transition to potential cancer treatment to a treatment for the removal of female facial hair (for all you bearded ladies) before finally being recognised for its effectiveness against trypanosomiasis. Trypanosomiasis has an estimated annual incidence of 300,000 in Africa where the miracle drug DMFO was named the "wake-up-from-dead drug". Desowitz also questions the morality and legality of patent laws covering biomedical "inventions" with the example of patenting the HTLV-1 virus derived from the blood of a Hagahai native of Papua New Guinea. He also describes the possible effects of global warming on infectious diseases and finishes the book with the tale of the recent emergence of the gastrointestinal parasite, Cryptosporidium.

Overall, this is a very entertaining and well-written book that deserves a place on the bookshelf of any 'card carrying' epidemiologist or medical microbiologist. Next time someone outside of microbiology asks you "why is infectious disease research important" lend them your copy of Robert Desowitzs' book and let them make up their own mind.

Environmental Microbiology

Raina M Maier, Ian L Pepper and Charles P. Gerba
Academic Press. Canada (2000)
585+xix. ISBN 0-12-497570-4
Price: £73.95
Reviewed by Russ Grant

The first thing that struck me about this book was in the preface and introduction. The authors describe this textbook as 'designed for a senior-level under graduate or a graduate-level class in environmental microbiology and to serve as a reference for any scientist interested in this field'. However I would consider it to be suitable for any 2nd level or university student interested in or studying the field of environmental microbiology. Unfortunately the price is not in the £25 - £35 range associated with most student textbooks and so it will remain a library resource.

Following a brief introduction to environmental microbiology there are chapters covering the general microbiology of viruses, bacteria, fungi, algae and protozoa (growth, transport, culturing, analysis, physiology, microscopy, disinfection, immunology) with additions to give an environmental slant, and chapters given wholly to pure environmental microbiology. A total of twenty four well written and comprehensive chapters are included, on microbiology in different and extreme environments (terrestrial, air, aquatic), various methods and techniques used in environmental microbiology (sampling, treatments), environmental biogeochemical cycling, agricultural microbiology, environmental pathogenic microbiology and treatments involving microbiology such as in the waste and water industries. The figures used are well presented, useful and are often used to summarise the text content. Photographs are also used throughout to good effect.

References are given with each chapter, as well as questions and problems from the information to test understanding of the text. These may be useful to a student but I found them little more than a basic comprehension exercise. An accompanying laboratory manual is also available by the same authors which provides actual experimental methods and techniques. The information contained in the book is as up to date as any other text book and made for an interesting and informative read. There are other similar texts in the field, and perhaps for the laboratory environment such similarly priced books as the *Manual of Environmental Microbiology* (C J Hurst et al.) are more appropriate, but this book is a good general text for everyone with an interest in the area.

Wine: A Scientific Exploration.

Sandler, M and Pinder, P, Eds. (2003)
London, Taylor and Francis
Reviewed by Emma Woodmansey

The objectives of this book are to clarify fact from fiction were wine is concerned, using a wide range of scientific views. This is certainly delivered in this entertaining yet factual read. The first few chapters provide a gentle introduction to the world of wine, giving advice on drinking wine and how best to savour the subtleties of its flavour, with top tips on how to enjoy wine at its best.

Following on from this, there is an in-depth historical review into the origins of wine as far back as 7000 BC. A summary table is used to display the main points of interest throughout history, which is useful, but somewhat long-winded. This data may have been better represented using a time line diagram to give a greater appreciation of the time scale involved in many of the discoveries listed. The archaeological evidence for cultivation and domestication of the grapevine by past civilisations is discussed in some detail. The author provides an insight into the many methods, such as liquid chromatography and other chemical analyses used to investigate what many people may consider just dust in the bottom of pots.

The constant battle against infestation of vines with the insect *Phylloxera* is covered, with historical and epidemiological evidence as to its origins. However, from a microbiology viewpoint, details of the many fungal and bacterial diseases associated with vines were lacking. In contrast, the discussion on modern winemaking processes endeavoured to re-address this imbalance. Building on the knowledge of winemaking as one of the oldest biotechnological processes, future advances in genetic modification is examined, highlighting beneficial alterations to many aspects of the process. The book reassuringly details the facts behind the many reported health benefits of wine, such as the link between moderate wine consumption and reduced rates of age-related macular degeneration, and low rates of cardiovascular disease. Although important, the latter area is slightly laboured with two chapters devoted to this topic. The purported mechanisms for wine polyphenol protection are discussed in depth accompanied by informative diagrams, making the information accessible to a wider audience. Unfortunately, this approach is not sustained in other chapters, making some sections difficult to follow.

Overall, this entertaining and interesting read should appeal to those from a scientific background. The authors have taken what is obviously a complex topic and done the subject justice by providing a high level of detail. With regard to a wider audience, some scientific knowledge would be an advantage for a thorough appreciation. Although this will be a demanding book for those not familiar with scientific writing or terminology, it would be a worthwhile and rewarding read.

PCR PROTOCOLS Methods in Molecular Biology – Volume 226

Editors: John M S Bartlett and David Stirling. 2nd edition. Humana Press
Reviewed by Georgina Hold

The book is a revision of the original PCR protocols due to the expansion of PCR methodologies since the original edition. The book does not set itself out to be an exhaustive manual of PCR technology as these have in many cases become the basis of separate publications. What is intended is that this book should be considered a 'core manual' for both novice and adept molecular biologists. The book presents worked examples for various aspects of PCR, which can be adapted or reproduced within the reader's own laboratory. Each section contains an overview to the

technique, which is to be presented including highlighting applications and limitations.

Part 1 provides an introduction to PCR which is concise and interesting. It discusses issues that should be considered if you are about to embark upon molecular biology — particularly PCR for the first time. It also discusses what you need to know should you be considering setting up a PCR laboratory. Part 2 discusses preparation of nucleic acid template for subsequent PCR. This section is well presented, discussing many of the pitfalls of extracting nucleic acids from difficult starting materials including archival tissues and ancient samples.

The rest of the book consists of 7 sections describing various PCR-based methodologies including basic methods, quantitative PCR, *In situ* PCR, PCR-based sequencing, cloning and mutagenesis. These sections provide a well-informed account of current knowledge, basic protocols, notes and referenced literature.

I like this book! It is what all molecular biology laboratories should have and contains information that is relevant to all levels of researchers. Whether you are new to molecular biology and need to know the basics, or you are looking to expand your techniques base, this book is applicable to all. Relevant and timely diagrams compliment the text; there are also heaps of references included at the end of each section. My only criticism of the book is its spiral binding. As a reference manual it will be opened time and time again, and I do not think the binding will live up to this usage.

Human Microbiology

Simon P. Hardy
Taylor and Francis Inc. N.Y. (2002)
ISBN 0 415 24168 5
Price: £15.99

Reviewed by Irena-M. Olejnik

This book, the tenth in the Lifelines Series edited by John Wrigglesworth, is comprised of two parts; Introduction to Microorganisms and Microbial Infections of Humans. The first covers six topics, bacterial structure and function, bacterial growth, viruses, fungi, microbial death, and microbial taxonomy and the second five - types of association, bacteria / viruses / and fungi as parasites and control of microbial infections.

The aim of the whole series is to provide information for undergraduates in order to enhance their knowledge of subjects peripheral to their main programmes of study. This book is well prepared for its avowed purpose, the language being readily accessible throughout. A summary, references for further recommended reading and the use of bold type for words of importance are to be found in each chapter.

Chapter one offers a tightly written review of bacterial structure and function with a good number of useful, clear, black and white drawings. Short 'foot-notes' in the margins and boxes of other pertinent information eg. on stains, osmotic pressure etc. further enhance the text.

Bacterial growth, the focus of chapter two, is presented in easily digested mathematical concepts to further the discussion of such crucial issues as growth-rate, generation time, mean generation time and doubling time. The explanations are complemented by a brief but comprehensive review of common nutritional patterns and pathways, and a comparison of the cellular location of essential metabolism found in prokaryotes and eukaryotes. The remainder of this chapter covers parameters of in vitro culture techniques, growth in vivo, gaseous requirements, methods of measuring bacterial growth, differential and selective media, enzyme synthesis and syntropism.

Chapter three on viruses defines and explains common nomenclature and starts with a discussion of the sizes of these obligate intercellular parasites, their structure and classification. The strategies of replication commonly used by different types of virus are covered particularly well in diagrams for each group i.e. double stranded DNA, positive-strand DNA, negative-strand DNA viruses and retrovirus. Virus assembly is also discussed as is host cell membrane attachment and viropexis. The chapter is completed with sections on cell, tissue and organ culture, the detection of virus by plaque counts, the formation of inclusion bodies, and other information pertinent to viral growth.

Fungal topics in chapter four include the structure and function of yeasts and moulds, basic fungal genetics, and elementary classification. As fungal disorders appear to be on the increase, it might be said that this section could benefit students by being expanded. Considering the very detailed virus section, it might have been helpful to have more notes on the culture and detection of common fungal strains as well as some of the metabolic products. Nevertheless, the information presented is again clear and succinct.

Microbial death in chapter five features methods to achieve sterilisation, disinfection and the problems of resistance. The latter points out the mode of action on DNA by modern antibiotics with sections on antifungal and antiviral compounds. Section one of the book concludes with a short chapter on microbial taxonomy and systematics as well as four methods of 'typing' commonly used in public health laboratories.

The remaining third of the book is section two, Microbial Infections and Humans. Chapter seven describes human/microbial interactions, while bacteria as parasites is the subject of the eighth chapter. Included in the latter is the process of infection, pathogenicity versus virulence, the action of exo- and endo-toxins and the presence of host signals which trigger pathogenic activity.

Chapters nine and ten highlight the parasitic nature of viruses and some fungi. The thirty main viruses at present known to be common disease agents in humans and the mechanisms of the virus / host immune response are considered, as are cellular processes of known viral carcinogenesis. It would have been interesting to include here work on the use of bacteriophage as agents of viral prophyllaxis in human disease, such work having been carried on for some time in the former Soviet Republic and other places. Fungi as agents of primary or secondary infections in humans and pathways of fungal pathogenicity are discussed.

The final chapter describes common, modern methods of controlling microbial infections from vaccinations through vector control to general public health policies, finishing with a list of the 4 levels of microbial hazards – from Group 1 which are unlikely to cause human disease to Group 4 — severe disease with no current prophylaxis.

As the government has just announced in December 2003 that the NHS will have a Director for Infection Control because resistant bacterial strains seem to be out of control in some hospitals, this book is extremely timely and should be of inestimable value, even required reading, for many outside mainstream science.

society for applied sfam microbiology

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- 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.

Special interests

The Society has six very active Interest Groups:

■ Bioengineering, ■ Educational Development, ■ Environmental, ■ Food Safety and Technology, ■ Infection, Prevention and Treatment, ■ Molecular Biology

Detailed information about these Groups can be found on the Society website.


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