Microbiologist

The magazine of the Society for Applied Microbiology ■ December 2003 ■ Vol 4 No 4 ISSN 1479-2699

SPACE INVADERS!

Scientists searching for extraterrestrial life need not necessarily leave the planet

ALSO IN THIS ISSUE:

YOUR LAST CHANCE TO BOOK FOR THE JANUARY MEETING - PAGE 16
Microbial Interactions with Medical Devices: a matter of life and death

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MEETINGS

FEATURES

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

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Vol 4 No.4
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Please submit all articles, reports, meetings notifications, letters etc., as plain text (*.txt) or rich text files (*.rtf). Please submit all images as original photographic prints or transparencies rather than scanned images and these will be processed by us and returned to you promptly. If your images are only in digital format please make sure they are supplied at a resolution of 300dpi (dots or pixels per inch at a size of not less than 100mm (4 inches) square.

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Website: the society website is a timely source of up-to-date information on all Society matters and maintains a comprehensive archive of articles and reports on a variety of microbiological topics.

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Table talk

RECENTLY I was invited to chair a session at a two-day conference on food microbiology and attended the conference dinner on the previous night. The excellent pre-dinner speech was given by Professor Richard Gilbert, OBE who reviewed a series of classic outbreaks of foodborne disease in all their D & V glory. I listened with interest as we waited to be served and at one point found myself surveying the room to see every delegate equally engrossed in the stories. I couldn't help but raise a little smile to myself given the irony of the situation and wondered whether any other profession engaged in such an equally unusual practice. I imagine each discipline has its 'stock' conversation; I recall listening-in on an after-dinner conversation between my wife, a research fellow in optometry, and her colleagues as they discussed the removal of the aqueous fluid from a patient's eye.

Everyone seemed to take this completely in their stride as they sipped their coffee, however, my toes curled within my shoes and I closed my eyelids tightly for fear my own eyes fell victim of an equally gory fate. I suppose I should be thankful I didn't marry a mortuary technician! *(If anyone is married to a pathologist or mortician I'd be intrigued to hear if my theory holds true).*

Upon reflection I imagine there isn't really a problem until there is a multi-disciplinary gathering such as, no doubt, will be presented over the festive season. Here some 'safe' topic of conversation is required which while stimulating and interesting does not interfere with the appetite of the uninitiated. I am guilty myself of converting one of my female friends to vegetarianism as a consequence of my idle banter about microbiology in abattoirs! So, in this issue of the *Microbiologist* along with the other regular features you've come to expect, we have compiled a couple of articles which should provide you with perfect conversational material from the hors-d'oeuvre right through to the Digestives (and I don't mean the biscuits!) Two articles by Jonathan Caddick and Richard Armstrong present the intriguing evidence for the existence of life on other planets from quite different microbiological viewpoints. The first article reviews the potential role of extremophiles and what we might be able to learn right here on our own planet, and the second discusses the possibility of lichens on Mars. Hopefully this will keep you out of trouble and the D & V's away from your Christmas celebrations! All that remains is for me to wish you a very Merry Christmas and Happy New Year on behalf of myself and all the *Microbiologist* production team.

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Shown the door

FROM: Stephen McGinness
SUBJECT: Research Funding Dilemmas

Before I came to the House of Commons I did actually go to the research councils to find out whether they would be interested in finding out how cost efficient the research proposal system was. I went to the ESRC as it seemed more social science - as research - than anything else. I thought that the other research councils should be good 'industrial partners' that would be willing to contribute supporting funds as they'd all benefit. None of them were willing to contribute money - though they said they'd be willing to discuss this as a commercial contract. It seemed a bit odd that research councils would be more willing to fund a private contract assessing their processes than submitting them to general research within their own system and supporting science in the UK at the same time. I got a job here before I got anywhere with the grant proposal.

Weighting game

FROM: Anna Gottlieb
SUBJECT: Citation Analysis

I wholeheartedly agreed with the comment made in the article on citation analysis by Sam Jaffe (*Microbiologist* March 2003, pp 30-31), that the use of citation analysis as a tool in the RAE may mean that "...the original purpose of a citation - to refer readers back to necessary source information - will be lost". However, I believe that publication and citation numbers have long been a benchmark to gauge an individual's professional standing, and understandably so, as it is one easily measurable parameter of professional progress. Thus it was with interest that I read the comments by Dr K R Davey and David Ey in September's *Microbiologist* mailbox, who highlighted the impact of the trend for multiple authorship on any publication or citation analyses. A weighting system based on the number of authors would reduce any artificial inflation in publication and citation numbers caused by multiple authorship. However, this system assumes equal contribution of all authors. Multiple-authored publications often include those involved with the work by association, especially in the case of jointly funded projects, who would receive the same proportion of publication and citation numbers with or without a weighting system.

A true reflection of an author's contribution could be made by applying a percentage weighting to each contribution to a multiple-authored publication, with the percentage decreasing in parallel to the order of authors, although this system would require guidelines on the order of authorship. These guidelines would have to be applicable to widely different project scenarios, from graduate or postgraduate studies to clinical evaluation or trials. Although guidelines on the order of authorship, or that only contributors with direct involvement in the publication could be listed as authors, are given in some instances, the impact of using citation analysis in the RAE will make universal application of these guidelines essential.

Cite Unseen

FROM: Claire McHenry
SUBJECT: Citation Analysis

Sam Jaffe's article in the March 2003 issue of *Microbiologist* should not surprise microbiologists. I have often obtained papers which were copiously cited in many journal articles, only to discover to my annoyance that the authors had clearly not read the paper, as nothing relating to it was remotely relevant despite a title that implied it would be.

I suspect that far too many authors compile their citation list from references to papers rather than the papers themselves simply because the references are ready to hand and the papers are not! Indeed, I know of one colleague who constructed her entire PhD thesis this way and by her own admission had probably read less than 10% of the papers she cited!

Microbial revolution

FROM: Mike Hamilton
SUBJECT: Antibiotic resistance

Peter Silley's article (President's Column, *Microbiologist* June 2003) raises some extremely important issues the present Government and big business simply aren't adequately addressing. In all probability a revolution will be necessary to topple the existing system and I don't say this with any relish. However, the growing problem of antibiotic resistance poses such a serious threat to the health of the population, that I cannot foresee anything short of a revolution addressing it. Also, although not as immediately urgent, technical and ethical issues involving genetic discrimination, genetic privacy, genetic rights and a selection criteria for a national voluntary, accessible, and affordable genetic screening and testing need to be eventually considered. There is no evidence that the current systems are interested in addressing any of these issues. My opinion is a movement needs to be urgently formed to address these issues before it's too late.

Answers to the September Code Breaker Quiz

The September code breaker quiz attracted a record number of entries with entries again received from many international SfAM members.

The winning entry was selected by an independent referee and was submitted by **Debbie Stevens** from Unilever Research, Wirral. Debbie receives a £30 book token for her code-breaking skills, well done.

The answer to the code breaker quiz was: **"Microbiologists do it in the laboratory with culture and are members of SfAM"**

I've decided that either the quizzes are too easy or microbiologists are too clever (or have too much time on their hands!) so I'm upping the stakes with a return of the much-loved word-search which I think is quite challenging. You'll probably need to consult your *Bergey's Manual of Systematic Bacteriology* to find the 20 **Archaea** hidden in the grid below. Circle the letters forming the name of the bug that can read in all directions.

All correct entries received in the Society Office by Friday 30th January will again be stuffed into the editor's lab-coat pocket (or autoclave bag depending on the response) and the winning entry drawn by an independent referee. The answers will appear in the March issue of *Microbiologist*. As usual, a £30 book token is up for grabs — so get searching!

The Archaea Word Search Quiz

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

Can you find the 20 **Archaea** hidden in the grid? Circle the letters forming the name of the bug that can read in all directions.
Then fill in your details at the bottom of the page and post your completed entry (or a photocopy) to the address below before 30th January 2004.

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 30 January 2004**. The answers will appear in the March 2004 issue of ***Microbiologist***.

Name: _____

Address: _____

Simply photocopy this page and send it to: 'Microbiologist Archaea Word Search 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.

Argentina

Professor A C Simonetta

France

Miss S Baron

Ireland

Miss D C Rooney

Nigeria

Mr K O Amisu

United Kingdom

Mr A M Burja; Miss C Huesa-Vinuesa; Ms S Lindsay; Dr J Pearce; Miss M K Spare; Mr R Stapleton; Mr T Williams; Dr T Worthington

society for applied sfam microbiology

Not a member?

The many benefits of membership are explained on page 50 where you will also find a reply card to request further information about the Society and its activities.

If you would like to join us please visit our website at www.sfam.org.uk where you can read about the many benefits of joining the Society and apply for membership by downloading a PDF application form

Dr Peter Silley reviews the role of the new Biosciences Federation, the steps the Society has taken to increase its public profile and reports on an exciting new initiative to support basic research.

THE CHALLENGE OF WRITING this column is not what to write about in each issue but what to leave out, the rate of change in the microbiology world shows no sign of abatement! I am pleased this issue to be able to focus on the official launch of the Biosciences Federation, to update you on the reasons behind our decision to appoint a Public Affairs Executive and touch on what I believe will be an exciting development in the life of the Society.

After a long gestation period the Biosciences Federation has now been officially launched. Speaking at the House of Lords reception in the presence of about 200 guests Science Minister Lord Sainsbury welcomed the new umbrella organisation. *"By speaking with one voice, rather than as individual societies, the Federation will give life scientists a greater influence on science policy not only in the UK, but also in Europe."*

We all hope that this will indeed be a reality rather than just a pipedream. No doubt many of you are asking just what the Bioscience Federation is and what will it do? Well, its first major public event was an education colloquium in early October that examined issues at the interface between school and university biosciences teaching. It attracted an audience of about 160 people and highlighted a number of issues including the challenges facing first year undergraduates in finding it difficult to work independently and adapt to different teaching methods. One of the conclusions being that school life had not prepared first year students particularly well for higher education. I guess that the same may be said by those of us who employ university graduates, that a university education does not always provide the necessary skills that are required by an employer. I know that this is certainly the view of many in industry and at the recent ICAAC (Interscience Conference on Antimicrobial Agents and Chemotherapy) meeting in Chicago this point was made very forcibly. Probably the most well attended session, the doors were actually closed, was that entitled, *"Why is Big Pharma Getting Out of Anti-infective Drug Discovery?"* Amongst the reasons said Steven Projan of Wyeth was the lack of good graduates with an understanding of basic microbial physiology. Higher education must understand that whilst we need to continue to push forward our


Picture by kind courtesy of CCFRA

understanding of what is happening at the molecular level, industry still requires microbiologists that understand fundamental microbial physiology and biochemistry and who are able to differentiate an *E. coli* from a *Staph. aureus* from a *Bacillus sp*. when growing on an agar plate.

There needs to be an ongoing dialogue between industry and academia to ensure that the output from our universities is, at least in part, appropriate to the needs of industry. Indeed one of my concerns with regard to the relevance of the Biosciences Federation is that it currently does not have anyone from industry on the Executive Committee. The Society has repeatedly made known our concerns on this matter and it is to be hoped that at forthcoming elections early in 2004 this situation will be rectified.

the **President's Column**

If the Federation is to truly represent the Biosciences community it must take into consideration the vast wealth of experience and expertise that resides in those scientists working within industry. With regard to matching output to need it is not just a concern of those working in industry. Sir Paul Nurse has recently left his position as Chief Executive of Cancer Research UK to take up the position of President of the Rockefeller University in the USA but before leaving the UK criticised policy makers for directing research too much towards 'health and wealth-creation' objectives. He argued that the most successful research is performed by identifying a broad area of interest, providing good resources, and leaving scientists to it. He also thought that the country should train fewer PhDs, pay them more, and improve academic job prospects in order to attract the best graduates. Nurse added that we are now producing a steady stream of well-trained postdocs for whom there are no jobs!

Many of you will have seen the advertisement in the national press for a Public Affairs Executive. This position arose from discussions which began at the Committee "Away Day" some time ago. One of the decisions taken at that time was to actively increase the profile of the Society. As part of this strategy it was identified that we need to increase the awareness of microbiology within the public domain. Such activities will involve effective communication with government, the media and in public fora. It has become apparent that this cannot be achieved through our existing structures and so a decision was taken to create a new salaried post within the Society to address these important issues. The new post will allow the Society to create links with relevant government departments, agencies, trade associations and the media in the UK and Europe, thereby increasing the awareness of microbiology amongst policymakers and communicators. Fundamental to this position will be the co-ordination and drafting of Society responses to Government and Agency Inquiries, preparing briefing papers and press releases. This will allow us to effectively work with existing structures within the Institute of Biology and the developing structures of the Biosciences Federation with regard to responding to consultations. In recent months we have worked with IoB and the Federation to respond to:

- Roberts' review of the RAE process (HEFCE)
- Improving standards in postgraduate education (HEFCE)
- Communicating the results of scientific research to the public (Royal Society)

I would particularly like to pay tribute to Hilary Dodson, Barrie Seddon and Sean Tyrrel for all their work with regard to these responses.

Apparently Europe needs an independent research council to support basic research, and this should be paid for by the EU using new money. A recent report has dismissed the idea that a European Research Council could be based on an existing organisation such as the European Science Foundation. It should be politically accountable to the European Parliament and its member states. Funding priorities and policies should be agreed in an open manner with political bodies, but the final distribution of grants *"should be decided on science quality without further political or geopolitical influence."* No doubt this will take some time to work its way through and in the meantime many of you will be aware of the European Framework Funding. I am delighted to be able to report that the Society has been invited and has accepted an invitation to be part of a Framework 6 proposal MED-VET-NET. The overall objective of MED-VET-NET is to develop a network of excellence for the integration of veterinary, medical and food sciences, in the field of food safety, at the European level, in order to improve research on the prevention and control of zoonoses including foodborne diseases while taking into account the public health concerns of consumers and other stakeholders throughout the food chain. This news is hot off the press and there isn't time or space to say too much more at the moment but you can be assured that we will all be hearing far more about this exciting initiative in the future.

Peter Silley

2003 sfam AGM

Present

Dr. P. Silley(Chair); Dr. M. Adams;
Dr. H. Dodson; Dr. J. Eastgate;
Dr. I. Feavers; Dr. A. Godfree;
Dr. P. Green; Mrs. M. Harrison;
Dr. A.C. Hilton; Dr. J-Y Maillard;
Professor C. Harwood; Professor D. Newell;
Professor J. Lynch; Stuart Pettit

1. Apologies for absence

Dr. M. Rhodes-Roberts; Dr. R. Park;
Dr. F. Skinner; Professor B. Jarvis;
Dr. Valerie Edwards-Jones;
Dr. Margaret Patterson;
Dr. Geraldine Schofield; John Waddell, Professor Peter Gilbert.

2. 71st Annual Meeting

Minutes of the 71st Annual General Meeting held on 10th July 2002 at University of Nottingham

The Minutes were approved as a true record – acceptance proposed by Alan Godfree, seconded by Anthony Hilton.

3. Matters arising

There were no matters arising.

4. Report of the Trustees

of the Society for the year 2002. *All reports are printed in the Annual Report.*

(i) Report of the Honorary President:
Hilary Dodson commented that Membership and Promotional Groups are now amalgamated. There were no other comments.

(ii) Report of the Honorary General Secretary:
The Honorary General Secretary wished it to be brought to the members' attention that this Report should show as much of the breadth of the Society's activities as possible – hence the graphs of funds and grants. There were no comments on the report.

(iii) Report of the Honorary Treasurer:
Peter Silley speaking on behalf of the Honorary Treasurer commented on the Society's healthy financial situation due to journals and re-iterated his thanks to all editors.

(iv) Report of the Honorary Meetings Secretary:
Jim Lynch commented that 220 people attended the recent PRG meeting on the same subject as the cancelled Surrey meeting and, of course, the dates had clashed. He suggested that all Convenors must now run as a group rather than a single organiser. Peter Silley advised the Committee had today agreed this for all future meetings.

Peter Silley commented that "Lab on a Chip" was very successful both from the attendance and scientific aspects, and was our first hotel based meeting. The Summer Conference 2004 would follow the same format and he advised the AGM that costs would be carefully evaluated to ensure as many people as possible would be attracted to, and able to attend, our meetings.

(v) Report of the Honorary Editors:
Alan Godfree reported impact factors since 2002 had risen from 1.79 to 1.89 for JAM, and from 1.15 to 1.18 for LAM.

(vi) Report of the Honorary *Microbiologist* Editor:
Diane Newell stated *Microbiologist* was very impressive. Peter Silley said all agreed and requests are being received for additional copies. Jim Lynch also endorsed this and asked whether copies could be sent to schools as it looks very interesting and it may help to change the view of microbiology in schools where it is currently viewed as dull and boring. Peter Silley advised the Committee had already agreed this course of action at their earlier meeting today.

5. Adoption of the Annual Report 2002

Adoption proposed by Ian Feavers, seconded by Stuart Pettitt and unanimously agreed.

6. Election of three members to Committee

Peter Silley said the voting was very close, but the final results, in alphabetical order, were:
(1) David McCleery; (2) Shona Nelson;
(3) Diane Newell
Martin Adams proposed acceptance of the above newly elected Committee members, Colin Harwood seconded. Diane was welcomed and congratulated on her appointment to the Committee.

7. Election of new members, deaths and resignations

The Committee have seen the list of new members and all were acceptable. Adoption proposed by Anthony Hilton, seconded by Peter Green and agreed by all.

8.Any Other Business

There was no other business.

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 2003, 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.

Have you received your 2003 Handbook inserts?

**New 2003 inserts for the Members Handbook were sent out with the last issue of *Microbiologist.* If anyone has not received their new set of inserts and/or would like their binder replaced, please contact Julie Wright, Membership Co-ordinator,
email: julie@sfam.org.uk**

Associate Membership

With effect from January 2004 a new class of membership, **'Associate Membership'** will be introduced.

This will be open to current and new Society members including School Teachers, existing Associate Student Members and those members taking a career break, on maternity leave or working temporarily in other areas, but who wish to retain an interest in microbiology.

The benefits will include:

- Quarterly copies of *Microbiologist*
- Substantially reduced rates at SfAM Meetings
- The opportunity apply for a grant from the President's Fund, subject to completing one years full membership
- Networking with worldwide professionals
- Access to the private members area of our new interactive website featuring discussion groups, member's forum, career opportunities, training information, consultancy lists and much more.

The cost of Associate Membership is £15.00 per annum

Please note: Associate Membership does not include access to the Society Journals, either in hard copy or on-line.

For further information on this or any other membership issue, please contact Julie Wright, Membership Co-ordinator in the Society Office.

Design-a-bug

The **design-a-bug** competition for children up to 12 years old launched in the September issue of *Microbiologist* has been such a huge success that we are extending the competition deadline until the 31st December 2003. We've already had over 100 entries! The winning entries in each age category will be featured in a special article in the March issue of *Microbiologist*. If you missed the September issue and want more information about the competition you can download a PDF version of the entire article including an application form from the following address on our website: http://www.sfam.org.uk/pubs/features

The competition has three age categories: under 4 years, 5 to 8 years, and 9 to 12 years.

How to enter

Tell your children a story about microorganisms or describe what they might look like and let their imagination run wild. Then ask them to 'design-a-bug' and draw what they think they would see if they were to look down the microscope. Send their pictures along with their name, age, address and a brief description of what the picture is based upon to The Society Office. The closing date for entries is Wednesday 31 December 2003. Pictures will be judged in the three categories and the winning entry decided by the Office staff. The winning entry in each category will receive a superb **Crayola®** drawing set and have their pictures published in the March 2004 issue of *Microbiologist*.

To enter, simply complete the form opposite, and post it, or a photocopy, to arrive at the Society Office no later than Wednesday 31 December 2003.

Design-a-bug ENTRY FORM

Your details

Title:_____ **Name:**_____

Address:_____

_____ **Postcode:**_____

Details of Entrant

Child's Name:_____ **Age:**_____

Address:_____

_____ **Postcode:**_____

Category: under 4 yrs: ☐ **5 - 8 yrs:** ☐ **9 - 12 yrs:** ☐

Brief description of what the picture is based on:

_____

_____

_____

If you need more room for your description please continue on a separate sheet. Then photocopy this form and post it to the address below. If you are submitting entries for more than one child please complete a separate form for each one.

Please post the completed form together with your pictures to:
"Design-a-bug competition", The Society for Applied Microbiology, The Blore Tower, The Harpur Centre, Bedford MK40 1TQ, UK.

Biosciences Federation gets the green light from the Science Minister

At the official launch of the Biosciences Federation (BSF) at the House of Lords on Monday 15 September, attended by Margaret Patterson, Arthur Gilmour, Geraldine Schofield, Jean-Yves Maillard, Sean Tyrell and Diane Newell from SfAM, Lord Sainsbury welcomed the new body and said that by speaking with one voice the Federation will give life scientists a greater influence on science policy, not only in the UK, but also in Europe. More joined up thinking on topics common to the biological sciences such as animal science, education, and Science & Society issues will enable bioscientists to respond effectively to the challenges facing the community.

Addressing around 200 representatives from the BSF's member societies and invited guests, including Lord Winston, Tim Hunt, Susan Greenfield and Ian Gibson MP, Sir John Sulston (former Director of the Wellcome Trust Sanger Institute) also expressed his delight that the BSF has come into being. He added: *"Biologists must engage in open debate with the public to gain trust and it is important for them to have a common ground"*. Colin Blakemore, current President of the BSF, noted that the launch is the culmination of several years of discussion about the representation of the biosciences in this country.

Caption Competition Winner!

The winner of our September caption competition with his impressive powers of observation and cunning wit is **Dr David Reynolds**, Microbial Developments Ltd, Worcestershire.

"Alan thinks hard about where he left his ring finger"

(Look closely at the picture! Ed).

Heineken Prize

The Royal Netherlands Academy of Arts and Sciences is inviting nominations for the **Dr H P Heineken Prize for Biochemistry and Biophysics 2004**. The prize will consist of a crystal replica of the microscope of Antonie van Leeuwenhoek, and US$ 150,000 to be spent at the discretion of the recipient. The winner of the Prize will be invited to the Netherlands to receive the award in person and given the opportunity to lecture at the Academy as well as other academic institutions in the Netherlands.

The selection of candidates will be based on nominations received from other scientists or from scientific institutions throughout the world. Prospective candidates should be active researchers who are expected to continue their research activities for at least ten years. Their achievements in the field of biochemistry and biophysics, including the biochemical and biophysical aspects of microbiology and the physiology of seed germination, should be outstanding and their achievements a source of inspiration to many others.

Nominations should be received at the Royal Academy by 1 January 2004. For further information on this and other Heineken prizes visit: **http://www.knaw.nl/heinekenprizes**

Find us a home?

Dr Fred Skinner wishes to dispose of his complete set of SAB Technical Series and Symposium Series books (44 volumes) as a donation to any educational or research institution, library or learned society. You can email Fred at: faskinn@ukgateway.net

sfam at FEMS

Lynne Boshier reports on the 2003 FEMS Congress held in Slovenia from 30 June – 05 July 2003

IN JUNE SFAM TOOK PART IN the first ever FEMS Congress, held in the Slovenian capital of Ljubljana, by sponsoring the name badges for all delegates and exhibiting with a Trade Stand. Peter Silley, (Hon President), Colin Harwood (Hon Editor, JAM) and myself attended.

After a short 1¾ hour flight with the national airline, Adria, I arrived in the warm sunshine of Ljubljana and what a delightful surprise this beautiful city was! Elegant architecture, an imposing hilltop castle, a lovely river meandering through the city centre, narrow cobbled streets, pavement cafes and restaurants offering an excellent choice of cuisine and a colourful fish and fruit market. However, the weather was equally surprising! Deciding to eat in a street restaurant that evening I settled myself at a small table and within 10 minutes of placing my order the sky had turned from a gentle orange sunset to a deep purple & black with strong gusts of wind, torrential rain and spectacular non-stop flashes of lightning and booms of thunder. Struggling to keep dry under the small umbrella covering my table I felt as if I had wandered into a Salvador Dali painting. Of course, I had no idea that I would experience this delight more than a few times during my week here!

The Congress was held at Cankarjev Dom — a rather ugly concrete building reminiscent of many Eastern European buildings from the late 1960s and 1970s. However the Trade Exhibition itself was held in an attractive hall with a glass ceiling enabling us to make the most of the glorious sunshine. I spent most of Sunday setting up the SfAM Stand. The onsite organisation had been very well handled by FEMS and the Congress was officially opened at 5.30pm.

Monday was extremely busy as it was the first full day and we had a lively passing trade of members, trade visitors and delegates with a large amount from Eastern Europe and the Middle East. Many members came by to introduce themselves to us or stop for a chat which is always a pleasure and we thank you very much for that. That evening delegates were treated to a National Evening of folk dancing, music and food in the old castle which overlooks the city. Despite it being a little windy, it was warm and most enjoyable and we would like to thank the FEMS Council and the Mayor of Ljubljana for their very generous hospitality. The following afternoon the Congress finished at 2pm and delegates were offered a choice of excursions including a city tour, a trip into the local countryside or out to the coast. The scenery surrounding Ljubljana is quite spectacular. To the west is the Adriatic with its rugged coastline, pristine beaches and clean seas, and to the north the Alpine regions of Bled and Bohinj. Bled, the more famous of the two, is surrounded by mountains and has a pretty lake at its centre with a fairytale castle in the middle appearing to rise out of the water.

It is now very commercial with a large number of hotels, shops and restaurants but is still extremely attractive. However, just a little further brings you to the stunning Alpine scenery of the lesser known region of Bohinj.

This is truly awe inspiring with rolling Alpine meadows, wooden chalets with geranium filled window boxes, rugged mountains, crystal clear lakes and tiny, onion-domed churches. Whilst there are a few small hotels and restaurants in the region, this is a much less commercialised area and is quite magnificent.

The remainder of the week followed the same pattern with many visitors to our Stand and we thoroughly enjoyed meeting so many people. As always there was a great deal of interest in our Journals and the on-line submission of manuscripts and I'm sure that exhibitions such as these enable us to reach a much wider number of people, particularly from areas such as Eastern Europe.

On the last afternoon Diman Van Rossum thanked all Sponsors for their participation and advised that the 2nd FEMS Congress will be held in Madrid in 2006. Our time in Slovenia was very well organised and most enjoyable and certainly for me, Ljubljana and the surrounding region was a wonderful surprise. I would definitely recommend this area to anyone wanting a weekend break to somewhere a little different or for anyone enjoying walking, fishing, spectacular scenery, clean coastal areas, good food and friendly people before it's discovered by the mass tourist trade.

Lynne Boshier
Office and Events Manager

News of members

Dr Colin Stewart has been appointed as a member of the Advisory Committee on Animal Feeding stuffs (ACAF) for 3 years from 1 September 2003.

Could you benefit?

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

sfam Overseas Development Award

SfAM wishes to assist microbiologists in developing countries and Eastern Europe through the introduction of a new award. All nominations for awards will normally be considered by the Awards panel in July, November and March of each year.

Purpose of Award

1. To support SfAM members to visit laboratories and give lectures and training in appropriate areas of applied microbiology
2. To support overseas SfAM members to visit UK laboratories to receive training in appropriate areas of microbiology
3. To support technology transfer in applied microbiology for which sources of funding do not exist

Guidelines

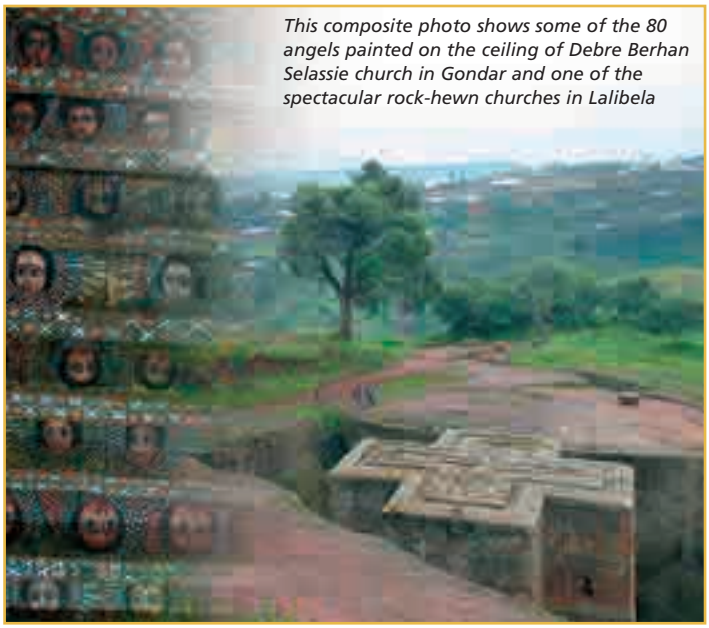
1. Individual awards up to a maximum of 5000 will be considered
2. The laboratory supporter must be a full member of the society and have held membership for at least 3 years
3. Detailed information must be provided about the relevance of the application and the available local support
4. Each application must be accompanied by full supporting documents
5. A condition of the funding is that an appropriate report must be produced for SfAM news

There is no application form for this award.

Education in Ethiopia

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

AS I WRITE, it is the summer break and the faculty is preparing for the start of the new semester in October. An escape from Awassa for a few weeks to visit the historical sites in the North of Ethiopia was amazing. They are little known in the western world, where the prevailing image of Ethiopia is of drought and famine. Although this is the case for isolated patches in rural areas the majority of the country receives plenty of rain and is very green and lush, especially around the rift valley which runs through the country. We visited some 800-year old churches in Lalibela and the surrounding region which are carved out of the bedrock. Before Christianity was introduced, the same skills were used to erect stellae (standing stones) in Axum. Some stand over 20 metres high and are carved from single pieces of rock. It was really good to see some other parts of the country, however, now it is back to work..



This composite photo shows some of the 80 angels painted on the ceiling of Debre Berhan Selassie church in Gondar and one of the spectacular rock-hewn churches in Lalibela

Teaching

The Freshman students could not start classes until their accommodation was built and as a result started a semester behind the rest of the university. The second semester was taught during the summer break. I also taught a summer extension programme course in microbiology. These students study part-time either in the evenings or during the summer for about five years (depending on their previous qualifications) to complete a BSc in either plant- or animal-science. Some of these students are unemployed and are funded by the government whilst others are given leave from jobs over the summer.

I have been in the lab trying out some practical experiments for a third year Cell Biology course. I successfully extracted DNA from onion cells and from *E. coli* using washing-up liquid and alcohol. Now my colleagues want me to prove it is DNA but we don't have any appropriate dyes. I'm thinking of trying to make some electrophoresis tanks – I found instructions on the Internet! – but I've no idea where I will find platinum wire to make the electrodes. All departments in the university suffer from bureaucratic problems in procurement. To alleviate this, some cash has been made available for the Faculty to go to Addis Ababa on a buying trip to purchase chemicals and equipment. Hopefully this will enable some good experiments to be designed for the practical classes next term.

Research

The good news is that we have been awarded some funding by Debub University for a small research proposal entitled "Bacteriological Analysis of the Quality of Drinking Water in Awassa". Working on this project with two colleagues, we plan to sample standpipes and in-house water containers from a number of households in Awassa and evaluate their microbial quality. We have submitted a list of chemicals and equipment required to the purchasing office and now have to sit tight to wait for them to be ordered and delivered. This could take a couple of months! Of course, there is still plenty of preparation to do. How do we randomly select households when there are no detailed maps of this town and no addresses as such? How do we design questionnaires to collect some socio-economic and demographic data? Amharic is only one of seventy languages spoken in this region and there is also a high rate of illiteracy.

Trying to think up ways of solving these problems is what makes my job so interesting and I'm learning to take things in my stride. The time seems to be flying which must be a good sign!

Jenny Search
University of Glasgow

Further Information

- This is the second 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

society for applied sfam microbiology

Microbial Interactions with Medical Devices: a matter of life & death

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

Supported by the Biomedical Applications Division of the Institute of Materials, Metals and Mining and the United Kingdom Society for Biomaterials

This Meeting has been awarded CPD accreditation to the value of 1.6 CREDITS

OVERVIEW

The acquisition of infections from contaminated surfaces is an age-old but increasingly relevant problem. From the home to industry and healthcare, surfaces play a critical role in the transmission of disease and contamination in many environments.

The development and increased use of medical devices has undoubtedly been of great benefit to patient care. However, inappropriate use and care of devices can increase the risk of infection leading to increased mortality, prolonged hospitalisation and increased costs. The causes and prevention of microbial contamination of surfaces involve a wide variety of organisms and strategies.

This meeting will address both the current areas of concern associated with contamination of medical devices and the application of new technologies to prevent and/ or control microbial contamination of surfaces.

The programme will include special sessions on ophthalmic and dental devices, and 'smart' surfaces.

BOOK NOW!

The closing date for registrations for this meeting is Wednesday 24 December 2003. If you haven't booked yet this is your last chance to do so!

Costs and late bookings

Costs are given on the Booking form overleaf. To book your place at the meeting please complete the Booking Form or visit the website where you can book online using a PDF form. Please note that the closing date for bookings is Wednesday 24th December 2003 and that a late booking fee of £20.00 will be applied to all bookings made after Monday 1st December 2003.

For the latest information please visit us online at:

www.sfam.org.uk

Programme

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

Wednesday 7 January

10.00 - 11.00 Registration - Coffee/Tea

11.00 - 11.40 Introduction: Surfaces and adhesion: a matter of life and death
Peter Gilbert, School of Pharmacy and Pharmaceutical Sciences, Manchester University, UK

11.40 - 12.20 Surface conditioning and microbial adhesion
Matteo Santin, School of Pharmacy and Biomolecular Sciences, University of Brighton, UK

12.20 - 13.00 Antimicrobials and indwelling catheters
Roger Bayston, School of Medical and Surgical Sciences, University of Nottingham, UK

13.00 - 13.40 Antimicrobial intravascular catheters - which surface to coat?
Mark Wilcox, School of Biochemistry and Molecular Biology, University of Leeds, UK

13.40 - 14.30 Lunch - Poster Viewing and Tradeshow

Ophthalmic and Dental/ Oral Devices

14.30 - 15.10 Biofilm related infections in ophthalmology
John Dart, Moorfields Eye Hospital, London, UK

15.10 - 15.50 Control of Bacterial adhesion to contact lenses
Gerda Bruinsma, Department of Biomedical Engineering, University of Gronigen, The Netherlands

15.50 - 16.30 *In vivo* bacterial adhesion to different contact lenses
Carol Morris, Diagnostic Lens Strategic Business Unit, Cibavision Corporation, USA

16.30 - 17.00 Tea/Coffee

17.00 - 17.40 Dental surfaces, diseases and treatment
Speaker to be confirmed

17.40 - 18.20 Photoactivated disinfection in caries and endodontics
Gavin Pearson, Queen Mary's School of Medicine and Dentistry, QMUL, London, UK

18.20 - 19.00 W.H. Pierce Memorial Prize Lecture

19.45 Tradeshow reception and Society Dinner

Thursday 8th January

New Technologies and 'SMART' surfaces

09.00 - 09.40 Microbial interactions with surfaces, studied on-line by a novel quartz crystal microbalance technique
Speaker to be confirmed

09.40 - 10.20 Atomic force microscopy and surfaces
Joanna Verran, Biological Sciences, Manchester Metropolitan University, UK

10.20 - 11.00 Biomimetic surfaces to reduce bacterial adhesion to medical devices
Andrew Lloyd, School of Pharmacy & Biomolecular Sciences, University of Brighton, UK

11.00 - 11.30 Tea/Coffee

11.30 - 12.00 Novel silicone-based materials with antimicrobial properties
Sean Gorman, School of Pharmacy, Queen's University Belfast, UK

12.00 - 12.40 New polymers
Speaker to be confirmed

12.40 - 13.20 Offered papers

13.20 - 14.00 Lunch - Poster Viewing and Tradeshow

Trigger systems: release of antimicrobials

14.00 - 14.40 Controlled release of antimicrobial from medical devices
David Stickler, Cardiff School of Biosciences, Cardiff University, UK

14.40 - 15.20 Controlling infection by tuning in and turning down the volume of bacterial small-talk
Paul Williams, Institute of Infection, Immunity & Inflammation, University of Nottingham, UK

15.30 Departure

BOOK NOW!

The closing date for registrations for this meeting is Wednesday 24 December 2003. If you haven't booked yet this is your last chance to do so!

Please note that a **LATE BOOKING FEE of £20.00** will be applied to all bookings made after **Monday 1 December 2003.**

If you want to attend this meeting please complete the booking form on the next page, use the PDF booking form on the website or contact Lynne Boshier at the Society Office. by email at: lynne@sfam.org.uk.

BOOKING FORM and INVOICE

January Meeting 7 - 8 January 2004

'Microbial Interactions with Medical Devices: a mattter of life and death'

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

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

CLOSING DATE FOR REGISTRATIONS

Wednesday 24 December 2003. A **LATE BOOKING FEE of £20.00** will be applied to all bookings made after **Monday 1 December 2003**

FEES

	Full Members	Student, Honorary & Retired Members	Non-Members
Whole Meeting Rate: includes registration fee, full breakfast, coffee and tea breaks, lunches, Society dinner and overnight accommodation for Wed 7th January.	£200.00	£100.00	£300.00
Day Delegate Rate: includes registration fee, lunch, tea and coffee breaks.	Full Members	Student, Honorary & Retired Members	Non-Members
	£65.00	£55.00	£150.00

Additional accommodation per night inclusive of breakfast: £120.00

YOUR COSTS

Charges - please tick the applicable box(es)	Amount
☐ **Whole Meeting Rate** (This includes accommodation, meals and the Society Dinner for the entire Conference):	£
☐ **Day Delegate Rate** (please tick the DAY you wish to attend): **Weds 7th:** ☐ **Thurs 8th:** ☐	£
☐ **Additional accommodation:** (please enter the extra NIGHT(S) you wish to stay:_____	£
☐ **LATE BOOKING FEE** Payable for all bookings made after Monday 1 December 2003:	£20.00
TOTAL AMOUNT REMITTED:	£

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

_____

YOUR DETAILS

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

Address:_____

_____ **Postcode:**_____

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

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 1 December 2003)** £_____

Card number: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ Expiry Date: ☐☐☐☐

Signature: _____ *Date:_____ Issue No. ☐☐☐ *(Debit cards only)*

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

_____

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**

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, Southwark London, 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.

The full programme and further information will be posted on the Society's website shortly

Call for papers

Current or recent research findings in the following areas related to food hygiene:

- Microbial survival, absorption, desorption, and dispersion
- Pathogen transfer by pests
- Pathogen deposition by pests via urine, faeces, egg-sacs, etc
- Legal context of food contamination, including issues of acceptability and risk of foreign bodies (alive/dead) in 'organic' produce

CLOSING DATE FOR SUBMISSIONS: Friday 30th January 2004

Protocol

Please submit an abstract of up to 500 words by 31 January 2004. Abstracts may contain limited figures if necessary and should be provided in Microsoft® Word format. Submission should ideally be by email to: lynne@sfam.org.uk. Alternatively on disc to Lynne Boshier at the Society Office. Please confirm in the submission your availability to make a presentation on 13th/14th May 2004. All abstracts will be submitted to a panel of referees consisting of academics and professionals in practice. For any other queries please contact Dr Belinda Stuart-Moonlight at: office@me-ltd.biz.

BRITISH ORNITHOLOGISTS' UNION

GM CROPS & BIRDS

5 – 6 February 2004 at The Royal Society, London

The issues surrounding GM crops and birds have received little attention in the ornithological press and literature to date. The results of the UK GM Crop Farm-Scale Evaluations (FSEs) are likely to first be available from mid October 2003, in the Royal Society's Philosophical Transactions: Biological Sciences. In order to encourage dissemination and discussion of the FSEs and other relevant research, the BOU is holding this open meeting.

FURTHER INFORMATION

The full programme and booking forms for this meeting are available from the BOU website at:
www.bou.org.uk/meet5def.html

And can also be obtained from:
Steve Dudley
BOU Administrator
Direct Tel: 01 733 844 820
Email: steve.dudley@bou.org.uk

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Call for offered papers

If you want to submit a paper for this meeting on any topic in microbiology please contact the Society Office for an abstract submission form. Deadline for submissions is 30 April 2004

Trade Show

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

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

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.

Call for offered papers

If you want to submit a paper for this meeting on any topic in microbiology please contact the Society Office for an abstract submission form. Deadline for submissions is 30 April 2004

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

Programme

Monday 12 July 2004

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

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, Eire

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, Eire

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

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, Eire

Wednesday 14 July 2004

Session 3. Human Health

Chair: Dr T Quigley, Safefood, 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

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

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, Eire

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 **WH Pierce Prize Winner**

18.00–18.30 **sfam Annual General Meeting**

Thursday 15 July 2004

Session 5. Novel Processes and Products

Chair: sfam Hon Vice-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, Eire

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

12.25 **Close of Conference and Lunch**

Trade Show

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

Space

In July 2004 the Cassini probe will enter into orbit around Saturn. This artist's impression by Craig Attebery shows the probe descending to the surface of Titan - Saturn's largest moon. The Cassini spacecraft flies overhead with its high-gain antenna pointed at the probe as it nears the surface

illustration: Stephen Pollard

Jonathan Caddick explains why scientists searching for extraterrestrial life need not necessarily leave the planet, the most likely places where planetary scientists believe life might be found in the Solar System and the four missions currently on their way to Mars

LIFE IN PLANET EARTH is abundant but whether life exists elsewhere in the Solar System remains uncertain. The debate concerning the infamous Martian meteorite ALH4001, found in 1996, is still raging as to whether we already have conclusive evidence of life from another planet[1]. As part of an effort to discover more concerning the possibility of extraterrestrial life, there are at present no fewer than four spacecraft en route to Mars. These include Europe's Mars Express, Japan's Nozomi and two NASA missions, Spirit and Opportunity.

The principal reason for a revival of interest in Mars has been due to a celestial alignment that occurred on Wednesday 27 August 2003 at 09.51 GMT, which meant Mars passed within 56 million km (35 million miles) of Earth; the closest the two planets have been together since 12 September 57,617 BC[2]! Not only has this heavenly configuration presented an opportunity to minimise the fuel required for the journey to Mars but it has also offered an appropriate occasion for the presentation of an article regarding the topic of life existing on other planets within our Solar System which most planetary scientists will agree are most likely to be microscopic organisms.

The search for extraterrestrial life is aided by the fact that Earth is teeming with life. Researchers are currently able to recognise microorganisms which may pose a hazard relating to interplanetary contamination and identify possible habitats on other planets that were once thought to be too extreme for life to survive. The word extremophile is a broad term used to describe microorganisms which live in environments that from a human vantage, are considered extreme. Microorganisms that are characterised in this way are of particular use to planetary scientists because the extreme habitats which are home to them are representative of conditions encountered on other planets in the Solar System. A group of extremophiles known as thermophiles (heat lovers) are used by researchers to understand how life survives in temperatures that can exceed 100°C. Probably the most well known of this group of microorganisms is *Thermus aquaticus*; the microorganism famous for giving us *Taq* polymerase (the first enzyme used for PCR).

Invaders!

In June 2003 the first of two US missions to Mars was launched from Cape Canaveral. The Mars Exploration Rover, dubbed 'Spirit' is expected to arrive at the red planet in January 2004. The robotic Spirit is expected to cover as much as 40 meters a day and will search for evidence of ancient water, from which implications might be drawn about the possibility of ancient Martian life. A second rover named 'Opportunity' was successfully launched on July 7th 2003 and will arrive at Mars a few weeks later.
A few days prior to the US missions, Europe's Mars Express commenced its journey to Mars from Baikonur Cosmodrome, Kazakhstan. This is the first European mission to Mars and will deliver a rover to the surface while a probe simultaneously orbits the planet

Recently a thermophile that can thrive at temperatures of 121°C was discovered near super-hot springs found at the bottom of the Pacific Ocean[3]. The deep-sea hydrothermal vent system where this microorganism was found is one of the most inhospitable places on Earth. There is no sunlight, temperatures exceed the boiling point of water and the pressures are hundreds of times more intense than on the Earth's surface. In fact researchers have already observed that this microorganism, named simply *Strain 121*, can survive autoclaving, which is one of the main techniques used for sterilising equipment that will travel through outer space. A microorganism such as *Strain 121* demonstrates that life can adapt to environments considered, until recently, sterile; environments yet undiscovered on other planets!

It is not only the hottest wettest places on Earth that are inhabited by microbes but also the coldest driest places. The Dry Valley's of Antarctica are another place of interest to planetary scientists as the conditions there mimic climates found on both Mars and Europa. The microorganisms which can survive the extreme cold of the Dry Valley's are known as psychrophiles (cold lovers). Soil microbes that are found in this hostile environment are for the first time being DNA fingerprinted[4]. From the data that is generated it is possible to gain a greater understanding of the diversity of these microbes and also identify how these microorganisms survive in such an extreme habitat. Researchers are currently trying to identify what substrates the microbes are metabolising and how they are adapted to survive extended periods of desiccation. Cold environments are of particular interest to planetary scientist as there are more potential subzero habitats in the Solar System than warm ones.

Similar studies are being undertaken on other types of extremophiles including halophiles (salt lovers), acidophiles (acid lovers) and alkaliphiles (alkaline lovers). In the outer limits of Earth's atmosphere researchers from Sheffield University have been able to culture two species of bacteria (*Bacillus simplex* and *Staphylococcus pasteuri*) and one fungus (*Engyodontium albus*) from samples collected by a weather balloon cruising at 41,000 metres (135,000 feet)[5]. It is uncertain how the microorganisms reached this altitude as particles of their size are not thought to be able to pass through an area of the atmosphere called the tropopause found at about 17,000 metres above sea level. Contamination from back on Earth is considered unlikely as the samples were freeze dried due to the extreme cold, dry conditions experienced at an altitude of 41km. One theory is that the microorganisms did originate from Earth and were carried past the tropopause by global air currents, however, this is considered highly unlikely.

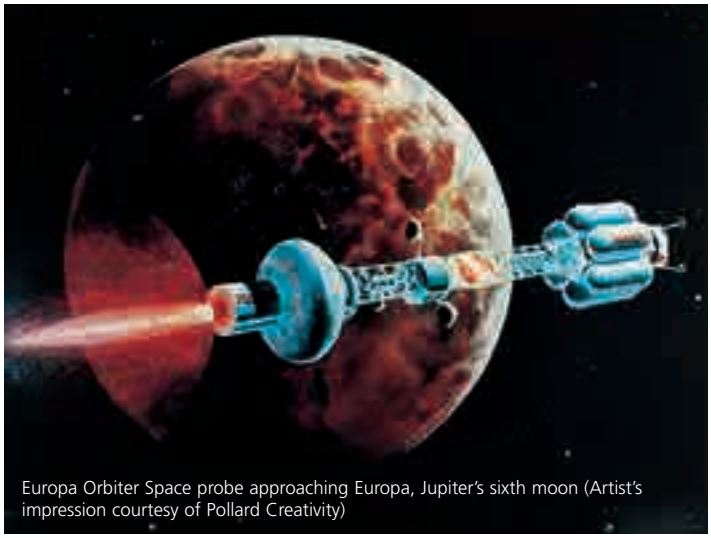
Another explanation is that the microbes are in fact alien in origin and were slowly descending to the Earth's surface due to gravitational pull. The latter possibility is based on a theory developed by Chandra Wickramasinghe and the late Fred Hoyle in the 1970s which suggests life

originated elsewhere in the universe and arrived on Earth via a passing comet.

Whether life began on Earth or arrived from somewhere else planetary scientists agree that there are to three highly probable contenders in the search for extraterrestrial life in the Solar System. These locations are Mars (the fourth planet from the Sun), Titan (Saturn's largest moon) and Europa (the sixth moon of Jupiter).

Europa is an icy moon, named after a Phoenician beauty seduced by Zeus in Greek mythology, which is roughly the size of our Moon. The surface temperature is on average -170°C, which would obviously mean any water on the surface of this planet is frozen. It is believed, however, that beneath the thick crust, which resembles sheets of ice, there is an ocean of water that remains in a liquid state due to heat generated by tidal forces from the gravitational pull of Jupiter and its other moons. This opinion is widely accepted due to sightings of complex fractures that criss-cross Europa's surface which resemble features observed on the frozen Arctic seas on Earth. The fact that water is essential for the existence of life and that Europa appears to have a liquid subterranean ocean has led researchers to believe that this moon is an ideal place to search for extraterrestrial life.

In 2008, NASA plan to launch the Europa Orbiter space probe with the intention of locating areas on Europa's surface where its crust is thinnest. Ultimately researchers wish to send probes beneath the crust and explore for life in the water that may lie beneath. Planetary scientists believe that Europa is such a habitable place for microbes that to prevent possible contamination of the moon's surface with terrestrial microorganisms it was necessary to destroy the space probe Galileo following completion of the Jupiter exploration. This was achieved in September of this year by sending it on a collision course with the planet. Researchers believed it might be possible for microbes to survive on Europa's icy surface in pools of water, warmed by radioactive plutonium used by the probe to generate electricity[6].



Europa Orbiter Space probe approaching Europa, Jupiter's sixth moon (Artist's impression courtesy of Pollard Creativity)

Titan, named after the race of god-like giants from Greek mythology, is the only moon in the Solar System with an atmosphere. The surface temperature on Titan is approximately -180°C and its atmosphere is thought to be composed mainly of nitrogen and methane. Observations of Titan's surface are almost impossible because of the dense orange clouds that form in the upper atmosphere, however, during a brief pass the NASA probe, "Voyager" detected liquid methane and what are thought to be continents on the surface of the planet. It has been suggested that Titan is the only other place in the Solar System that has a liquid flowing on its surface. In this instance lakes and rivers are thought to be formed by liquid methane and ethane. Some planetary scientists believe that the Earth was once like Titan and that early forms of life could exist on its surface or in pools of simple hydrocarbons. Although this may be the case some researchers feel that Titan is too cold to currently harbour life. It has also been suggested that in Titan's past it was warmer place and that microscopic life could have evolved, the remains of which may still be present on its surface. In July 2004 the Cassini probe will enter an orbit around Saturn. The study is expected to last for four years in which time the Huygens probe destined to land on Titan will be launched. It is not known whether the probe will touch down on solid ground or in liquid so the probe has been designed for either eventuality.

Mars was probably the most studied planet in the Solar System, excluding Earth, before the 20th Century. One of the fundamental observations made by the Italian astronomer Giovanni Schiaparelli in 1877 led to the discovery of *'canali'* (channels) on the surface of Mars. The misinterpretation of the Italian canali for canal in the English speaking world is commonly considered to have motivated the belief by some astronomers that artificial canals may have been built by a Martian civilisation! Due in part to the interest raised by these channels more than 30 operations have been sent to investigate the red planet since 1960[7]. Although, of all the probes launched for the purpose of Mars exploration more than half have failed giving the impression that the red planet is in some way jinxed.

This artist's impression shows the Cassini-Huygens probe descending through Titan's thick atmosphere with Saturn setting dimly on the horizon. The probe is due to arrive at Saturn in July 2004. Artwork courtesy of Pollard Creativity

Mars can be up to 378 million km away from Earth and although our nearest celestial neighbour, excluding the Moon, it is far from inviting. A single Martian year lasts the equivalent of 687 Earth days and temperatures can range from a mild 27°C in the summer to a chilly -133°C in the winter. The atmosphere is composed mostly of carbon dioxide and offers little protection on the surface from UV-rays as it is thinner than that on Earth with little ozone; only 0.13% of the atmosphere is oxygen. To all intents and purposes Mars appears very different from Earth. Despite these differences Mars is in fact more like Earth than any other planet in the Solar System. There is also solid evidence that Mars may have water on or near its surface, the presence of which is a subject of debate amongst planetary scientists. Mars is also the best mapped with more known about its climate and geology than any of the other planets.

Although, much is already understood concerning Mars, the interest in this celestial body endures because it is not known whether life has at any time existed there. In an endeavour to find life, as stated previously, four missions are currently making there way to the red planet now.

The first of these four missions was Japan's probe Nozomi, meaning "hope" in Japanese, which launched from the Kagoshima Space Centre on 4th July 1998. This space craft is expected to arrive later than originally planned due to damage received from a solar flare. If however everything else goes to plan Nozomi is expected to reach Mars in early 2004, where it will remain in orbit to study how the planet is affected by solar winds; the stream of charged particles emitted by the Sun[6]. The two

The largest canyon in the Solar System cuts a wide swath across the face of Mars. Named Valles Marineris, this grand valley is over 3,000 kilometers long, up to 600 kilometers wide and delves as much as 8 kilometers deep, dwarfing the Earth's Grand Canyon. Its origin remains unknown. Photo courtesy of Viking Project.

NASA spacecraft, Spirit and Opportunity, were launched in June 2003 from Cape Canaveral, Florida. Both spacecraft carry rovers that will be deployed on opposite sides of Mars. The probes will jettison the landers 300 metres above the surface allowing them to parachute to the surface encased in a cluster of airbags[6]. Once at a standstill solar-panel petals will deploy so that the landers can begin to explore. One of the rovers is scheduled to land in a region named Meridiani Planum which is rich in the mineral haematite; a form of oxidised iron that on Earth rarely forms in the absence of water. Using a high-power microscope the rover will collect evidence of how the compound formed by examining the size and orientation of haemotite grains[6].

The second lander is expected to touch down at Gusev Crater. This site was chosen by NASA scientists because of its resemblance to lakebeds on Earth. Using an array of equipment it is hoped that evidence of water having ever been present in this area might be found[6].

Launched on Monday 2nd June 2003, a few days prior to the first NASA mission, Europe's Mars Express commenced its journey to Mars from Baikonur Cosmodrome, Kazakhstan. This is the first European mission to Mars and is the sole operation that will deliver a rover to the surface of Mars and have a probe that will simultaneously orbit the planet. The probe is set to study the composition of the Martian atmosphere while the rover named Beagle 2, will land in a similar way to the two NASA rovers, in a region called Isidis Planitia.

This area is a crater approximately 1,600 km wide that separates Mars' more cratered southern hemisphere from its flatter northern hemisphere. It is hoped that past volcanic domes and small channels may have preserved evidence of life. Beagle 2 carries a mass spectrometer that can measure the relative amounts of carbon isotopes in Martian rock samples[6]. Results from this type of sampling may indicate that life once existed on Mars.

The possibility of finding life within the Solar System remains hopeful and assuming that the missions to Mars are a triumph it may be as soon as 2004 that we find the evidence.

Where next? Well for some astrobiologists it would seem that we must look much beyond the confines of the Solar System. The best place to look for life may be the 37th brightest star in the constellation of Gemini, approximately 42 light years away from Earth[8]!

Jonathan Caddick
Aston University

References:

■ **1**. Anon. Conclusive evidence for Martian life. http://news.bbc.co.uk/1/hi/sci/tech/1190948.stm. (accessed 20/10/2003).

■ **2**. Anon. Skywatchers await Mars encounter. http://news.bbc.co.uk/go/pr/fr/-/1/hi/sci/tech/3174275.stm. (accessed 27/08/2003).

■ **3**. Anon. Microbe breaks temperature record. http://news.bbc.co.uk/go/pr/fr/-/1/hi/sci/tech/3144397.stm. (accessed 15/08/2003).

■ **4**. Anon. Molecular biology goes to extremes. http://news.bbc.co.uk/1/hi/sci/tech/1885198.stm. (accessed 20/08/2003).

■ **5**. Wainwright, M., Wickramasinghe, N. C., Narlikar, J. V. and Rajaratman, P. (2003) Microorganisms cultured from stratospheric air samples obtained at 41 km. *FEMS Microbiology Letters*. **218**; 161-165.

■ **6.** Giles, J. (2003). Mars Attracts. *Nature*. **423**; 473-477.

■ **7**. Anon. Historical log. http://mars.jpl.nasa.gov/missions/log/. (accessed 20/10/03).

■ **8**. Anon. Found: The best place for alien life. http://news.bbc.co.uk/go/pr/fr/-/1/hi/sci/tech/3177684.stm. (accessed 09/10/2003).

Could Lichens grow on Mars?

Richard Armstrong boldly goes where few microbiologists have gone before and concludes the truth is out there

Artist's impression of the exploraration of the Martian surface. Artwork courtesy of Pollard Creativity

MARS IS AN inhospitable, barren, and rocky planet unprotected from ultraviolet light and subjected to freezing temperatures and frequent sandstorms. In the past, however, it was a warmer planet, probably with large oceans, and with an atmosphere closer in composition to that of Earth.

Over long periods of time, the surface water on Mars has been lost resulting in the arid planet that we see today. There has been considerable debate over the last few years as to the possibility of life on Mars. This debate has arisen as a result of studies of Martian meteorites, of Earth environments considered to be analogues of those on Mars, *e.g.*, the dry valleys of Antarctica, and the discovery of exposed water ice near the edge of the southern pole of Mars (Titus *et al.*, 2003).

The idea that lichens could grow on Mars is not new having been proposed as early as 1949 to explain the colour changes that had been observed on the surface. Lichens could fulfil some of the requirements for growing in such an extreme environment. First, they can be dried to water contents between 1-15% of their dry weight and survive for a considerable time in a dehydrated state. Second, some Antarctic lichens can be plunged into liquid nitrogen and survive and third, lichens are unusually resistant to levels of radiation that would kill most other types of plant. It was the discovery of endolithic lichens living within the rocks of the dry valleys of Antarctica which has provided a new impetus to the debate. Hence, this article considers first, aspects of the biology of lichens, second, considers the Martian environment and the prospects for present and past life on the planet, and third, discusses the arguments in favour and against the possibility that lichens could have developed on Mars.

What are lichens?

Anatomy and physiology

Lichens are very common organisms on Earth and are found in a range of environments including the surfaces of rocks, trees, and man-made structures (Fig 1). Lichens occupy some of the most inhospitable terrestrial environments from hot arid and semi-arid regions to the cold Polar Regions. The ability of lichens to tolerate extremes is partly physiological, *e.g.*, their tolerance of extreme conditions, but also behavioural in that lichens can adapt to relatively protected niches within extreme environments.

Lichen is an intimate association between two quite different organisms, *viz.*, an alga and a fungus. The two organisms are so intimately associated that the term

Figure 1. A community of foliose and crustose lichens on a slate rock surface in Wales, UK. A rich lichen flora is present on the surface of the rocks and orange lichens of the genus *Caloplaca*, yellow species of *Xanthoria*, and light grey species of *Pertusaria* are visible.

mutualism or symbiosis has been applied to it. In cross-section (Fig 2), a typical lichen is composed mainly of fungal tissue but embedded in the upper cortical layers are eukaryotic algal cells. Some lichens are also associated with cyanobacteria (blue-green algae) found in special structures called cephalodia. The algal partner carries out photosynthesis and supplies the fungus with carbohydrate but there is little experimental evidence that the fungus supplies nutrients to the alga (Smith and Douglas 1987). There are three major types of lichen, viz., the fruticose type in which the lichen thallus is attached to the substratum at a single point and forms a complex branched structure, the foliose type that comprises a series of radially arranged leaf-like lobes, and the crustose type that is tightly attached to the substratum. Most lichen communities have a mixture of the three growth forms (Fig 1).

The foliose and crustose types of lichen grow radially over the substratum rather like a fungus on an agar plate but growth rates are very slow. Many foliose species have rates of radial extension between 2 and 5 mm per year but many crustose lichens grow much more slowly with rates of less than 0.5 mm year (Armstrong 1973, 1983). Some species grow so slowly that larger thalli growing in the Arctic may live to be over 5000 years old, thus making them some of the oldest organisms on Earth. The slow growth of lichens is not attributable to slower than normal physiological processes but to the fact that lichens lose much of their carbohydrate due to respiration. A lichen can spend a considerable amount of its time in a dehydrated state (Fig 3), but when the lichen is wetted there is a loss of carbon due to resaturation respiration. After wetting, photosynthesis begins to replace the carbon lost but the lichen has to remain wet for a sufficient period in the light to make good the carbon losses and then to make new carbon for growth (Armstrong 1976). Frequent rain showers combined with rapid rates of drying in the sun may continually deplete carbon with little left over for growth processes. As a result of slow growth, however, the lichen may make little demand on the environment for nutrients thus enabling the organism to grow in potentially nutrient-poor habitats.

Endolithic lichens

The Viking Lander photographs taken on the surface of Mars in the 1970s show a cold desert landscape with scattered boulders (Fig 4). Examination of these boulders shows no evidence of lichens growing on their surfaces. Nevertheless, as in the cold, dry valleys of Antarctica, there is the possibility that endolithic lichens were present in the rock in the past or may even survive today.

Three types of endolithic organisms have been described: (1) 'chasmoendoliths' — which occupy fissures and cracks in rocks but the organism may be partially exposed on the surface, (2) 'cryptoendoliths' — which occupy pores and pre-existing structural cavities, and (3), 'euendoliths' — that bore into relatively soluble rock substrates such as those rich in carbonate (Lawrey 1984). In 1974, numerous microorganisms were discovered in Beacon sandstone rocks of the dry valleys of Antarctica. Cyanobacteria were present but the dominant flora was chasmoendolithic and cryptoendolithic lichens. The lichens occupied a narrow zone of the subsurface of the rock 10 mm thick and formed colonies from a few centimetres to a metre in diameter (Friedmann 1982). The lichens had a similar structural organisation to those that live on the surface but a true fungal zone was absent, with instead, the fungal hyphae filling the available pore space. In cross section, a typical rock consists of a black zone just below the surface containing the alga *Trebouxia*, below that a white zone of fungal tissue, then a green layer of non-lichenised green algae, and finally, in some samples, a layer of cyanobacteria. The subsurface layers are often solubilised by fungal hyphae resulting in the upper surface peeling away to expose the lichen tissue.

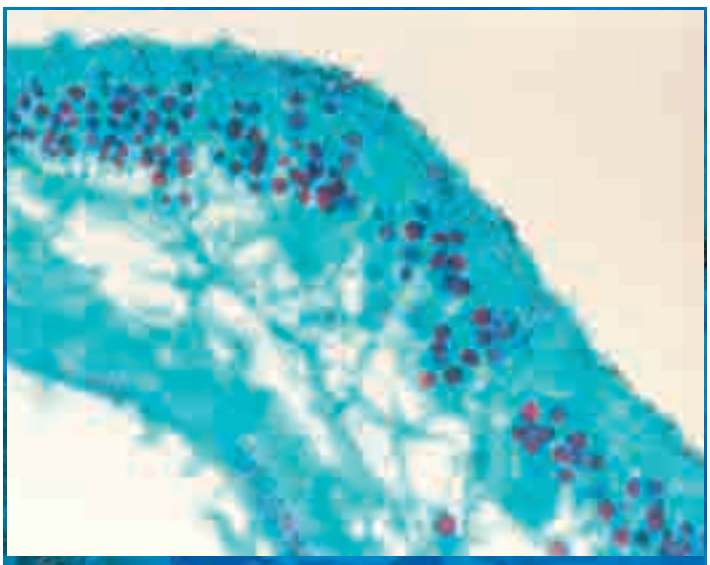


Figure 2. Vertical section through the thallus of the foliose lichen *Xanthoria parietina*. The algal cells (dark red spheres) are confined to the cortical layer just below the surface of the lichen. Below, the medulla composed of fungal hyphae can be seen.

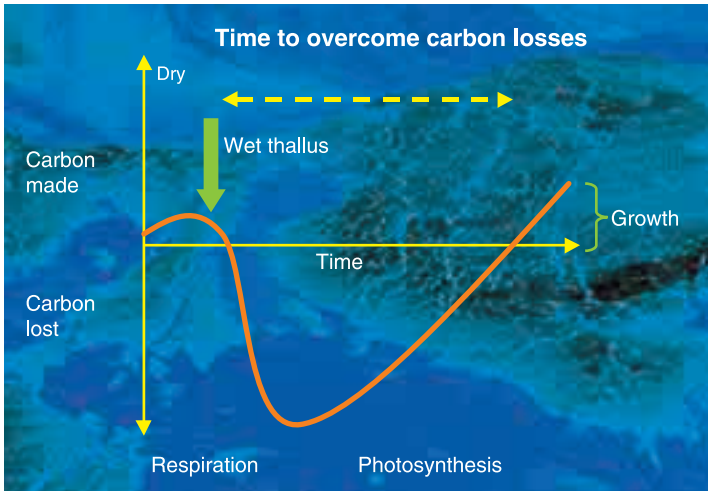


Figure 3. The consequences of wetting a dry lichen. Little carbon is made when the lichen is dry. When the thallus is wetted, there is a burst of respiration and carbon is lost from the thallus. Photosynthesis then begins to replace the carbon lost but the lichen has to be wet long enough in the light to overcome the carbon losses and to make new carbon for growth.

Further penetration of the rock results in more rock layers being lost and the consequence of this 'biogenic weathering' is a characteristic pockmarked surface on the sandstone surfaces of the dry valleys. Close-up photographs of Martian boulders may therefore be useful in detecting the possible presence of endolithic lichens (Fig 4).

The Martian environment

In "Cosmotheoris", published in 1698, and one of the earliest expositions on the possibility of extraterrestrial life, Huygens deduced that Mars was much colder than Earth. Recent measurements of temperature on Mars have confirmed these early impressions in showing that the daytime surface temperature may vary from 26.6°C during rare sunny days to –93°C at the poles in winter. The air temperature, however, rarely rises above zero and decreases markedly with altitude above the surface.

In 1784, Herschel commented that Mars and Earth have a similar diurnal motion and length of year but also mentioned the more tenuous atmosphere on Mars. The first attempts to detect oxygen and water on Mars spectroscopically were made in 1867 but were inconclusive. However, in 1909, Campbell failed to detect water vapour in the Martian atmosphere using a spectroscopic method and concluded that the environment was extremely arid, a result confirmed by Adams in 1926. In 1947, Kuiper, using infrared spectrograms, detected carbon dioxide in the Martian atmosphere at twice the levels of Earth but no oxygen. Viking 1 showed that the atmosphere of Mars was composed mainly of carbon dioxide with trace quantities of nitrogen, argon, oxygen, and carbon monoxide (Nier *et al.*, 2003).

Spinrad in 1963 was one of the first scientists to study the possibility that water was present in the Martian atmosphere and reported, using spectroscopic observations, that the level of water was one thousandth of that in the atmosphere above the Sahara desert on Earth. Subsequent studies using theoretical climate models and experiments on Earth simulating Martian environments (Kuznetz & Gan, 2002) demonstrated that liquid water may be stable for extended periods of time on the Martian surface under present-day conditions. These studies have culminated in the discovery of water ice near the edge of the southern polar cap by Mars Odyssey using the Thermal Emission Imaging System (THEMIS) (Titus *et al.*, 2003). Hence, surface water ice may be widespread around and under the carbon dioxide polar cap.

Could lichens live on Mars?

Microorganisms

Lichens are composite organisms consisting of an alga and a fungus living in mutualistic association. Hence, the presence of lichens on Mars presupposes the evolution or transport to Mars of both the fungal and algal components of the symbiosis. The presence of microorganisms on Mars, either living today or as fossils of past life, however, is highly controversial. On August 1996, NASA announced that there was evidence of life in a Martian meteorite (ALH84001) that had entered Earth's atmosphere 13,000 years ago and landed in Antarctica. The existence of life in the meteorite was based on four lines of evidence. First, that the carbonate patterns had a unique life signature consistent with those expected of terrestrial bacteria. Second, that polycyclic aromatic hydrocarbons, usually created by bacteria, were present in the meteorite. Third, that magnetite globules are created by bacteria on Earth as well as by some chemical processes. However, only bacteria are likely to have caused the distinctive tear-shaped globules present in the Martian rock. Fourth, worm-like structures were observed in the meteorite. These structures are much smaller than most bacteria but recently similar sized terrestrial fossils have been discovered. In addition, biogenic features have been found in three Martian meteorites, including eight of the amino acids that are constituents of terrestrial proteins, but there is still no conclusive proof that these are evidence of ancient life (Gibson *et al.*, 2001).

On the surface of Mars itself, experiments have also produced ambiguous results. The Viking Landers sent to Mars in the 1970s carried out experiments to detect the presence of organic materials in Martian soil. One such experiment detected no organic compounds while another showed positive results. The positive result could have been attributable to superoxides or peroxides present in the Martian soil and which reacted with the test solution when it was mixed with these oxides. There have also been attempts to detect atmospheric biomarkers of subsurface life on Mars. Bacterial life below the surface may depend on hydrogen and carbon monoxide as energy sources (Summers *et al.*, 2002) and it may be possible to observe the metabolic by products of these organisms as trace gases in the atmosphere. Organic trace gases in the atmosphere tend to have very short chemical lifetimes but CH_4 has a much longer lifetime and tends to be more uniformly distributed. However, the flux of CH_4 into the Martian atmosphere is 10^5 times less than on Earth suggesting that there can only be a minute biological component on Mars. Hence, there is no convincing evidence, at present, for the

existence of past or present microorganisms on Mars, a necessity for the evolution of lichens.

Endolithic lichens on Mars

In the dry valleys of Antarctica, the absence of water and low temperatures are the most important factors limiting endolithic lichens. The lichens that live in these environments on Earth are not better adapted to colder or drier conditions than their surface counterparts but occupy a new niche by changing their pattern of organisation. In addition, the relative humidity below the surface is consistently higher than at the surface where evaporative water loss is high. Studies suggest that the lichens require snow meltwater as a source of water as no endolithic lichens occur on the steep or vertical faces where snow cannot accumulate (Kappen *et al.*, 1981). Endolithic lichens on Mars would be able to tolerate the low temperatures of the Martian surface but as in the dry valleys of Antarctica, the rock subsurface is likely to be warmer and subjected to smaller fluctuations than the surface of the rocks. Nevertheless, the lack of a ready supply of surface water would be a significant problem for the lichens. It is a possibility, however, that in certain areas, water ice on the surface melts and penetrates the boulders, the lichens remaining in a dehydrated condition during the long intervening periods.

In Antarctica, carbon dioxide exchange takes place very slowly through a relatively thick surface crust (Kappen & Friedmann 1983) and this could presumably also take place in Martian rocks. In addition, in regions of high light intensity, approximately 1% of the light reaches the lichen zone inside Antarctic rocks, the harmful UV being screened out by the dark-pigmented fungal layer and this process would be even more important in Martian rocks. The main source of nitrogen for endolithic lichens is abiotically fixed nitrogen by atmospheric electric discharge, the fixed nitrogen then being conveyed to the rock by atmospheric precipitation. However, there are only trace amounts of nitrogen gas in the Martian atmosphere (Nier *et al.*, 2003) and hence, it is unclear how a Martian endolithic lichen would obtain its nitrogen supply. One possibility is that cyanobacteria in the rocks can fix sufficient nitrogen from the trace levels available to supply the lichens.

Conclusions

Lichens meet some but not all of the criteria that must be fulfilled by inhabitants of Mars (Salisbury, 1962). They could withstand many aspects of the hostile environment especially if they live within the rocks as they do in the dry valleys of Antarctica. Lichens, however, are dual organisms and we have to presuppose the successful establishment of a variety of microorganisms on Mars and especially algae and fungi. To date, the evidence for the existence of microorganisms in Martian meteorites is controversial and there is no conclusive evidence of present life on the surface. In addition, if endolithic lichens have evolved on Mars and are alive today they would be subjected to a considerably more hostile environment than the extreme environments on Earth, which are regarded as at the limit of tolerance of present day lichens. The lack of liquid water over most of the surface and the problem of obtaining sufficient nitrogen resources are particular problems for Martian lichens. Further landings on Mars, scheduled for 2005 and future missions are likely to substantially increase our knowledge of the Martian surface and the possibilities for life by attempting to bring back samples of rock and minerals. In addition, the use of techniques such as Laser Raman technology and the development of gas chromatographic methods for use in space increase the probability that an answer to the question of whether lichens have existed on Mars will be obtained in the near future.

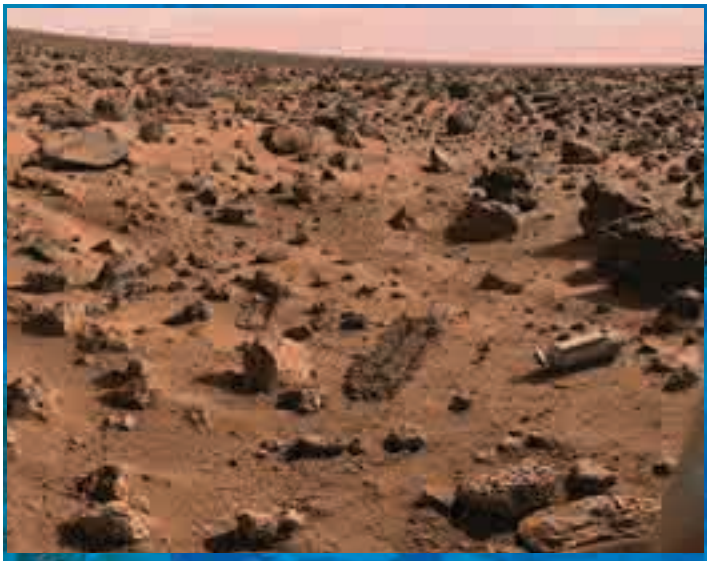


Figure 4. Viking 1 panorama of the Martian surface. Could the pitted and scarred boulders in the foreground have resulted from the activity of endolithic lichens? Photograph courtesy of Dr Edwin V Bell II (NSSDC) and Mary A. Dale-Bannister, Washington University, St Louis, USA.

Richard A Armstrong
Aston University

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STUDENTS into WORK

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.

For further information visit the website or contact the Society Office

picture by kind courtesy of Unilever Research

Researching *Helicobacter pylori*

FACING MY FOURTH and final year at the University of Aberdeen, studying towards a BSc (Hons) Genetics with Immunology degree, I was keen to gain some practical research experience. I was, therefore, delighted to accept a ten-week work placement with the National Collection of Industrial, Food and Marine Bacteria Ltd. (NCIMB), researching the bacterium *Helicobacter pylori.*

H. pylori (originally named *Campylobacter pyloridis*) is a Gram-negative, spiral shaped rod originally discovered by Barry Marshall in 1982. The organism infects the mammalian G-I tract with sophisticated methods of colonising the epithelial lining of the stomach and the ability to thrive in its acidic environment. It is able to enter and encase itself in the stomach's mucus lining thus protecting itself from the surrounding gastric juices whilst also evading any immune response.

Studies of this organism have led to it being widely regarded as a major causative agent in gastro-intestinal illnesses, including peptic ulcers, chronic gastritis and the development of gastric cancer. The most successful means of eradication at present is through combination therapy. Triple or quadruple combinations of antibiotics are used, but are expensive with many patients presenting with nausea, vomiting, bloating and abdominal pain as side-effects of the treatment. Failure of the antibiotic regimen has mainly been attributed to poor patient compliance and bacterial resistance, which has given rise to research into possible alternative therapies. Treatment through the development of a probiotic may be one such solution.

My project, therefore, was to screen a selection of bacteria from the NCIMB

open collection for inhibition of *H. pylori;* the objective being that successful candidates could potentially form the basis of a probiotic therapy. Those selected were representative strains of *Lactobacillus*, *Lactococcus*, *Bifidobacterium* and *Streptococcus*. Some of these bacteria are reported as inhibiting the growth of other microorganisms on mucosal surfaces by adhesion and competitive exclusion. In order to colonise the area effectively they also produce inhibitors to interfere with and prevent the growth of other bacteria.

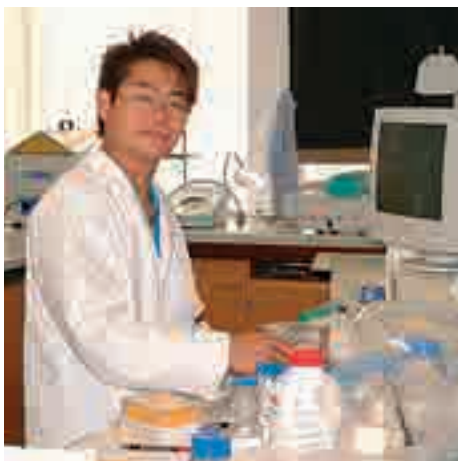
The culture collection bacteria which were screened for their antagonistic properties were cultured in appropriate media and used to impregnate sterile paper filter discs. These discs were then placed on Columbia + 10% blood agar plates, pre-seeded with the type strain of *H. pylori* and incubated in a humid microaerobic atmosphere. Where the bacterial bioactive inhibitors produced inhibited *H. pylori*, a zone of inhibition of growth was seen around the disc and recorded. Bacterial strains that gave a positive result were then selected for further testing. In addition to the forty-six bacteria from the culture collection, nineteen human gastric isolates were obtained from external sources, as well as probiotic capsules, and commercially available probiotic yoghurt drinks. Also screened for inhibitory activity were a limited range of natural plant extracts, honeys and similar products. Such bioactive extracts are known to inhibit both Gram-positive and Gram-negative bacteria of clinical significance and could also potentially be used, either alone or in combination with a probiotic, in the treatment of *H. pylori*. The project results were encouraging in that some of the bacteria and natural products tested did inhibit *H.pylori*, however further work is required to develop the project further.

Until this work experience, the only laboratory work I had undertaken before my placement with NCIMB was confined to University practical classes. As such, the SfAM summer studentship gave me the opportunity to gain invaluable research experience and an insight into the running of a commercial scientific company. Through the project, I not only learned new practical skills in handling, culturing and preserving bacteria, but also time management and project planning. The continual development and refinement of the methodology proved challenging yet satisfying when the results came together. On a more personal level, the project was successful in re-affirming my desire to pursue a career in research once I graduate.

I would like to thank my project supervisor Dr. Peter Green, as well as Dr. Hedda Weitz, Julie Brown and the other NCIMB staff for their guidance and for making the past ten weeks both memorable and enjoyable. I would also like to extend my gratitude to the SFAM for making this placement possible and giving me such a great opportunity.

Catriona Young
University of Aberdeen

Design and evaluation of a protocol to test the efficacy of biocides against biofilms of *Streptococcus mutans*



DURING JULY AND AUGUST 2003 I had the pleasure of participating in a summer research project at the University of Brighton. The aim was to determine the effectiveness of amine oxide as a biocide against a monoculture-biofilm of *Streptococcus mutans* and to develop a protocol mimicking the oral environment in which they are found.

S. mutans is the causative agent for dental caries. It is found in dental plaque. There is a natural layer of plaque on the surface of the teeth acting as a host defence against pathogenic micro-organisms. Over developement of plaque can prevent the beneficial properties and buffering effect of saliva from penetrating and protecting the enamel. This, together with the capability of *S. mutans* to metabolise sugar rapidly, promotes the generation of an acidic environment. The exposure of enamel to low pH causes the surface of the apatite crystals to dissolve and demineralize the tooth structure which eventually leads to caries. The formulation of mouthwashes and toothpaste contain anti-plaque biocides such as triclosan and chlorhexidine and although their effectiveness has not been lost, it is necessary to acquire new agents with even better characteristics prior to development of microorganism resistance. Non-aromatic non-ionic surfactant amine oxides are believed to be such newer substances.

Amine oxides (AO) are surfactant disinfectants, but the cationic quaternary ammonium salts (QACs) are more widely used. Certain AO have been shown to have an antibacterial effect which exceeds those of QACs. The aim of this project was to develop a protocol which mimics conditions in the mouth, thus allowing the effectiveness of AO to be tested against a monoculture-biofilm of *S. mutans*. It is essential to use a *S. mtuans* biofilm as previous studies have indicated that biofilms are a cooperative community, where each bacterium posses the ability to alter its phenotypic state in response to environmental changes. Such transformation means that bacteria found in the biofilm will have different phenotypic characteristic compared to its planktonic counter-part. Hence, chemicals which are successful in eliminating planktonic bacteria might be less effective against sessile cells and, therefore, studies performed using planktonic *S. mutans* might not be appropriate to represent the effect of AO against biofilm of *S. mutans*.

The use of hydroxyapatite (HA) discs was employed to provide a surface for the formation of a biofilm. The HA discs composition is similar to that of the teeth and has been shown to be a convenient approach to mimic the oral environment. As in teeth, the attachment of the pioneer *S. mutans* first requires the presence of a salivary pellicle on the HA discs. The pellicles were formed experimentally by incubating HA discs with sterile saliva, collected from volunteers. The saliva was then removed and replaced with

a pure culture of 10^8 CFU/ml of *S. mutans* so that the biofilm could be formed. The HA discs were then removed from the solution and deep-washed three times in 2ml of diluent before any experiment procedures were performed on the discs. Treatments included the use of AO organic matter in the form of bovine serum albumin which served to mimic food. Spinning magnetic fleas were placed on top of the biofilm to stimulate the effect of brushing. This was then be used to compare with the effect of AO and the treatment of both procedures together.

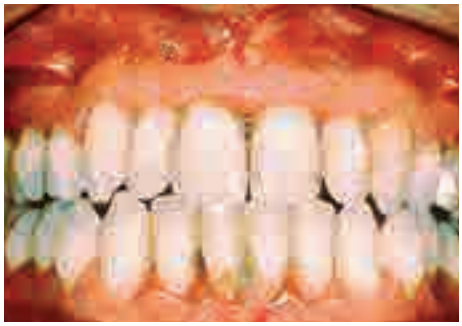
The results of the experiments proved that AO is a very effective biocide against monoculture-biofilm of *S. mutans.* It has been established that the method of mechanical removal used in the experiment only removes 12% of the *S. mutans* population. A single exposure to AO alone was able to remove 47% of *S. mutans*, while multi-exposures have been shown to eliminate the entire population. This suggests the AO would be effective against *S. mutans* when incorporated into both mouthwash and toothpaste.

The summer project allowed me to gain a first-hand insight view into research, as well as gaining valuable experience and laboratory skills, which I am sure I will find useful in my education and future career. I also had the opportunity to apply skills already taught and understood their usage in a real situation. I would like to express my appreciation to SfAM for providing this valuable opportunity. My sincere thanks to Dr J-Y Maillard and Dr G Hanlon for the placement and their support. Thanks also to Sébastien Fraud.

C.F. Cheng
University of Brighton

Fluorescence of Dental Plaque using (QLF)

MUANTATIVE LIGHT INDUCED FLUORESCENCE (QLF) is a novel approach used to determine mineral loss in tooth enamel. Fluorescent light irradiation (520nm with 370nm blue filter) reveals differences in enamel opacity, hence providing an early indication of caries. Sound enamel appears green whilst a loss of mineral gives rise to a loss in fluorescence, so carious lesions appear



dark, and are easily visualized. QLF may also be used to indicate the presence of plaque on teeth, since the micro-organisms fluoresce to some extent during the process. This enables some estimate of tooth coverage by plaque to be made, with obvious implications in oral hygiene. But plaque does not fluoresce evenly. Some areas fluoresce orange, whilst others are green. It has been proposed that these differences relate to mature and new plaque respectively; this suggests it is possible that Gram-negative obligate anaerobes are contributing to the orange fluorescence. The aim of my project was to investigate the cause of orange fluorescence in plaque imaged using QLF.

I worked in the microbiology laboratories at Manchester Metropolitan University, where I am studying for my degree in Biological Sciences. My supervisor was Prof. Joanna Verran. My other supervisors were Prof. Sue Higham at the University of Liverpool Dental School, where the QLF equipment was located; and Dr Phil Smith and Mr Iain Pretty at the University of Manchester Dental School.

Over 200 taxa have been described in dental plaque, thus the study of plaque microbiology is not easy! Initial studies involved the sampling and plating out of saliva and plaque specimens onto a range of culture media, incubated under different conditions. All plates were examined under QLF, and any fluorescent colonies were subcultured for further study. There were surprisingly few colonies showing the required properties, which could have been due to differences in growth conditions from those encountered in plaque, or to technical difficulties arising from the diffuse light being emitted from the source, its distance from the specimens, and low magnification. This was a problem which I was able to resolve, because I was able to see red/orange fluorescence in colonies using epifluorescence microscopy and appropriate filters. In addition, smears taken from these colonies revealed cells fluorescing orange. This result means that more thorough *in vivo* screening studies can now take place, with more accurate and detailed characterization of fluorescent isolates being undertaken.

While waiting for ethical approval for clinical sampling of denture plaque, I carried out some laboratory experiments to further investigate the source of fluorescence. It has been proposed that the fluorescence is due to the presence of porphyrin-type molecules. I therefore continued the project focusing on two organisms known to produce porphyrins, and which were potentially encountered in the oral environment; *Porphyromonas gingivalis* and, to a lesser extent, *Propionibacterium acnes*. I investigated the effect of the concentration of different inorganic iron compounds on the growth and fluorescence of these two species. In future work, as part of my final year project, I intend to investigate more fully the factors responsible for fluorescence in these test species. Once appropriate microorganisms and test conditions for fluorescence have been identified, model systems can be developed for further study of factors affecting plaque fluorescence under QLF.

I really enjoyed my project. It was good fun being part of a research team, and I certainly learnt that things do not always go as planned! I found the clinical applications of the work really interesting, and the opportunity to work with dentists, cariologists and microbiologists was great. I would also like to thank the lab technicians, PhD students, and Uzmma for their help and particularly thank Sfam for enabling me to carry out this project.

Ross Hill
Manchester Metropolitan University

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Once again, our members have used 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 below or visit our website.

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! It is not only our student members who require our help. Senior microbiologists often find difficulty in funding attendance at meetings, and the President's Fund is there to help them. **If YOU are in this position, why not apply to the President's Fund?**

Guidelines

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 Application forms, together with an abstract of any intended contribution to be made, must be received by the Society Office not less than six weeks before the date of the event.

5 Student member applicants must enclose a letter of support from their supervisor or head of department on the letterhead of their institution.

6 The maximum grant available is normally £500.

7 Under exceptional circumstances this maximum may be exceeded.

Applications for a grant from this Fund can be made via the Society website or using the official form available from the Society Office.

The 43rd ICAAC Conference

Chicago, USA. 13 – 17 September 2003

The annual Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC) is the major international meeting on antibiotics, antiviral agents and treatment of infectious diseases. At Don Whitley Scientific we specialize in conducting microbiological studies to evaluate antibiotic efficacy and safety, so ICAAC is particularly relevant to my colleagues and I.

Having received support from the SfAM President's Fund to attend the 2003 meeting, I took the opportunity to travel to Chicago early and participate in a pre-meeting educational workshop on pharmacokinetics (PK) and pharmacodynamics (PD). From my point of view, this alone provided a good reason for attending the conference.

The conference itself took place over the following 3½ days and at any one time there were many concurrent oral and poster sessions from which to choose. I started by attending a two hour review session that provided an overview of poster presentations in the area of new preclinical drug research: this is an excellent means of identifying interesting material and organizing one's itinerary without having to walk around the vast conference centre! It was disappointing (though perhaps not entirely surprising to those involved in the industry) to learn that relatively few novel antibacterial agents were in the pipeline. Compounds described here were mostly developments of existing antibiotic classes. These included the ketolides (telithromycin and cethromycin are currently-licensed drugs in this class) aminomethylcyclines (developed from the core structure of tetracycline but rather more effective against bacterial resistance mechanisms) and several improved fluoroquinolones.

As always at an ICAAC meeting, there were many sessions dealing with bacterial resistance to antibiotics. One particularly enjoyable symposium discussed the application of PK/PD parameters to predict resistance development. An interesting issue that might not be familiar to non-clinical microbiologists is that the PK/PD parameter correlating best with emergence of resistance depends on the class of antibiotic. For example, development of ceftizoxime resistance in an animal abscess model of *Enterobacter cloacae* infection was very neatly predicted by the period of time during which *in vivo* antibiotic concentrations exceeded the MIC. Dividing the total daily antibiotic intake into more frequent doses, thus keeping the concentration high, reduced emergence of cephalosporin resistance in this model. Another implication of this effect is that cephalosporins with a longer half-life *in vivo* may be more effective, both in terms of eliminating the bacterial pathogen and in preventing emergence of resistant strains. A rather different situation applies to fluoroquinolone antibiotics (e.g. ciprofloxacin, moxifloxacin and gatifloxacin), for which the most important PK/PD parameter is the area under the concentration-time curve (AUC) achieved *in vivo* over a 24 hour period. This is related to our more familiar *in vitro* measurements of antibiotic activity by calculating the AUC/MIC ratio. Thus, the ability of fluoroquinolones to eliminate resistant bacteria is affected by the total daily antibiotic dose rather than the period of time for which the MIC is exceeded. Once again, though, a quinolone with a long half-life can be more effective in terms of both clinical cure and elimination of resistance.

Several papers addressed the issue of "mutant

selection". Within any population of bacteria susceptibility to a given antibiotic varies between individual cells. This means that the MIC is simply the minimum antibiotic concentration that inhibits the majority of cells in the population, to the extent that we can't detect visible growth at the end of the test. But, given sufficient incubation time and a sufficiently large bacterial inoculum, growth of the resistant cells can be revealed in the presence of an "inhibitory" antibiotic concentration. For beta-lactams and several other antibiotic classes, bacterial cells develop resistance by acquiring new genetic material (e.g. plasmids, transposons), but for fluoroquinolones and certain other compounds, resistance is predominantly caused by single chromosomal mutations. This has given rise to a relatively new concept, the Mutant Prevention Concentration (MPC), which is defined as the minimum antibiotic concentration capable of inhibiting growth of the least susceptible first-step mutant in a large bacterial inoculum (usually 10^{10} cells). The MPC may be several multiples of the MIC, and the range of antibiotic concentrations falling between the MIC and MPC is described as the "mutant selection window". To minimize the possibility of selecting antibiotic-resistant mutants during a course of therapy, it is desirable to "close" this window by devising a dosing regimen that avoids *in vivo* antibiotic concentrations within this range. Whilst this is an important goal, it is not always attainable in a living patient, due for example to side effects at high antibiotic doses.

There has been much doom and gloom in the scientific literature and press regarding the emergence of antibiotic-resistant "superbugs" and the end of the antibiotic era. Whilst some of this has been exaggerated, it has stimulated some fascinating quests for novel antibacterial agents. One of the ICAAC highlights was the Aventis Pharmaceutical Award lecture by Bob Hancock of the University of British Columbia, in which we learned about antimicrobial peptides: these are important components of the innate defences of all animal and plant species and many have good activities against a broad range of bacterial strains, kill very rapidly and do not easily select resistant mutants. Modifications of these molecules are currently in development as novel drug candidates.

Finally I must convey my thanks to the Society for helping to fund my attendance: the knowledge gained during this important conference has already been put to good use in my work.

Andrew Pridmore
Don Whitley Scientific Limited

Functional Genomics of Gram-positive Microorganisms. 12th International Conference on Bacilli

Baveno, Italy
22 - 27 June 2003

The conference was held at the beautiful location of Baveno in Northern Italy. Our hotel and the conference venue had spectacular views over Lake Maggiore to the Alps in the distance. We arrived in the middle of a heat wave and with temperatures of 35°C we were all glad of the air-conditioning.

The first session on Monday 23 was broadly Genomics based; **Philip Glaser** (Pasteur Institute) kicked off the proceedings with a talk titled "Genomics of *Streptococcus agalactiae*" this organism being the leading causes of neonatal infections. He described how they had recently sequenced this organism in conjunction with TIGR, and talked about how there was a presence of many mobile regions some with pathogenicity islands. The control of toxin and protective capsule production in *Bacillus anthracis* was investigated by **Theresa Koehler** (University of Texas Medical School). Using transcriptional profiling they found that the regulatory

genes *atxA* and *acpA* were in control of many more genes that previously thought in both virulence plasmids and in the chromosome. **Gerhard Gottschalk** (Georg-August-University) gave us a talk on the genomics of *Clostridium tetani* which has been recently sequenced by the same group. He described the regulatory cascade needed for production of the tetanus toxin which causes 400,000 mostly neo-natal tetanus cases per year. *Listeria monocytogenes* is an important bacterial pathogen of humans and animals and **Carmen Bruchrieser** (Genomics of Pathogenic Microorgainsm, Pasteur Institute) investigated the role of PrfA as a global regulator of virulence genes. **Richard Lewis** (School of Cell and Molecular Biosciences) a new addition to the recently created Structural Biology Unit at the University of Newcastle gave a talk titled "Structural analysis of the partner-switching mechanism regulating the environmental stress response of *Bacillus subtilis*". During his talk he described how the proteins that form the signal transduction mechanism of the SigmaB regulon are held in large (~1MDa) intricate complexes. The first day talks were rounded up by **Jim Brannigan** (Structural Biology) from the University of York.

The second day opened with a session focusing on bacterial Regulation followed by an afternoon session on Sporulation. The keynote talk was presented by **Richard Losick** (The Biological Laboratories, Harvard University) on "Spo0A and its regulon" and for me was the most interesting talk of the whole conference. Spo0A is the master regulator for entry into sporulation, and using transcriptional profiling he identified 56 genes that are a direct target for Spo0A. Among these genes is an operon that produces a peptide antibiotic and its resistance gene. When activated by Spo0A this antibiotic kills non-sporulating cells, moreover an operon for a novel extracellular signalling protein was found which prevents cells from sporulation making them more susceptible to the antibiotic. He argued that sporulation is the last resort for the cell and cannibalizing other cells can help provide nutrients for these cells to survive.

Wednesday started early with a session on Transcription/Translation followed by a session on Regulatory Genomics the first talk being "Transcriptome analysis extends the TnrA-

GlnA nitrogen regulatory system in *Bacillus subtilis*" given by **Hanne Jarmer** (Center for Biological Sequence Analysis, Technical University of Denmark) this talk highlighted the power of transcriptional analysis. They found new members of the TnrA regulon using cDNA microarrays and upon further analysis they discovered all these genes had TnrA-box in their promoter region. An interesting talk was given by **Rainer Borriss** (Institute for Biology, Berlin University) titled "Comparative analysis of the genomes of *Bacillus amyloliquefaciens* and *Bacillus subtilis*". Here the closely related organism to *B. subtilis* is sequenced and the genome data analysed. *Bacillus amyloliquefaciens* has many antibiotic clusters and degradative enzymes which are fully functional unlike its model organism cousin. Forty years of repeated sub-culturing have taken their toll on *Bacillus subtilis*168 with it being amusingly described as not only a cannibal but being paralysed too.

The final day of lectures for us was Thursday 26 which would finish with the second poster session and then one of the highlights of the trip, the banquet - but first we had a full day of lectures which were split in three parts a Pathogenesis session followed with Secretion then Cell division/DNA Metabolism. In the Pathogenesis session **Helge Holo** (Laboratory of Microbial gene Technology, Agricultural University of Norway) gave an excellent talk with the catchy title "Peptide bacteriocins against Listeria and Enterococcus — one molecule kills a cell". In a bacteriocin assay he showed that most of the bacteria were killed in minutes at a concentration of 10^{-13}M of bacteriocin. This equates to less that 10 molecules per cell.

The secretion session was chaired by **David Ellar** (Oxford University) and ended with the banquet, but first we had remembrance of a pioneer in the Bacillus community **Costa Anagnostopoulos** who recently died at the age of 85. After a minute silence there were thank you speeches to the organisers and several speakers were awarded prizes. The food at the banquet was excellent; I have never eaten a seven course meal before and probably never will again.

I have mentioned only a few out the 84 talks given and in no order of merit, there were many excellent talks that I have not reviewed. The conference was not only valuable for me in terms of gaining scientific knowledge but gave me an opportunity to meet with old friends and colleges and talk about all aspects of scientific life in-and-out of academia and industry. I would like to thank SFAM for allowing me the chance to attend this important and prestigious conference.

Nick Allenby
The University of Newcastle upon Tyne.

The 7th International Symposium on *In Situ* and On Site Bioremediation

Orlando, Florida, 2 - 5 June, 2003

Let me start by thanking the Society for the award of £500 which allowed me to attend this symposium on bioremediation. As most people know, Orlando has many attractions, including Walt Disney World, The Magic Kingdom, Epcot Centre, Animal Kingdom, and Disney-MGM Studios, all of which offer lots of entertainment. Other major attractions include Seaworld and Universal Studios. The combination heat, humidity and the surrounding attractions make Orlando an excellent venue for combining business with pleasure.

The Symposium was held at Disney's Coronado Springs Resort complex. The resort's architecture, extensive landscaping, shops, and restaurants mimic the traditions of the American Southwest and northern Mexico. State-of-the-art meeting facilities provided efficient backing for the Symposium's technical program and exhibits. Special thanks should be offered to the Battelle staff, who were extremely welcoming and helpful.

The objective of the Symposium was to facilitate technology transfer and integrate the latest developments in fundamental research with innovative engineering applications in the field of bioremediation. As with previous symposia, this Symposium brought scientists, engineers, consultants and regulators together from around the world. The symposium was supported by four high profile experts in the environment and remediation, namely Edward O Wilson, whose keynote address was entitled *'The Future of Life'*; James M Tiedje, who talked about *'Microbial Life with Chlorochemicals: from the Gene to the Field'*; Robert E Hinchee, who discussed *'Efficacy and Maturity of Bioremediation for Environmental Restoration'* and finally, Naomi Duerr, who presented an interesting talk on *'Restoring America's Everglades: meeting the Challenge'*.

The presentations covered a large number of scientific interests and disciplines, ranging from fundamental environmental processes to full-scale remediation; at any one time there were five sessions running simultaneously. My research interests lie in the area of bioavailability of contaminants to soil microflora and I was able to present a talk entitled *'Cyclodextrins: a chemical mimic of PAH bioavailability in soils?'* as well as several poster presentations entitled *'Effect of pyrene on the availability of phenanthrene in soil'*; *'Development of intrinsic pyrene catabolism in soil'*; *'Impact of plants on the behaviour of 2,4-dichlorophenol in two soils'*; *'The evolution of catabolism in soils treated with cable insulation oil'*; *'Standardising a methodology spiking LNAPLs into field-wet soil'*, and *'Impact of transformer oil on phenanthrene ageing in soil'*. The scientific sessions were excellent and very well attended. From the presentations made at this symposium, it is clear that bioremediation is no longer perceived as a research toy, but is now considered as a viable option for the clean-up of contaminated environments and is often used in combination with physical and chemical treatment strategies. It was also very interesting to see the scale to which bioremediation is being applied, particularly in the USA. My attendance gave me the opportunity to meet researchers from the USA, Canada and closer to home who had like minded interests, the result of which has been the formation of several new research collaborations.

Finally, I would like to thank Sfam once again for allowing me to attend this important symposium.

Kirk Semple
Lancaster University

Report on 2nd International Conference on Tick-Borne Relapsing Fever

The second international conference on tick-borne relapsing fever was held in Mvumi, near Dodoma, Central Tanzania. This is the second meeting to bring those working towards control of this spirochaetal disease endemic to this region. This disease caused by the *Borrelia duttonii* and transmitted by *Ornithodoros moubata* tick vectors, remains a significant cause of mortality and morbidity throughout much of Tanzania. In this region, traditional houses are frequently infested with the tick vector, and the disease particularly affects young children and pregnant women resulting in foetal loss and neonatal deaths (perinatal mortality rate of 436 per 1,000)

Delegates were updated on the number of cases in the Mvumi and Mwanza districts. The annual incidence in children in Mvumi under a year is 384/1000 and 163/1000 in children under 5 years however, little data is collated from the local levels on disease incidence for the remainder of Tanzania. Recent work on the tick vectors suggests that *O. porcinus domesticus* may be the principal vector of this disease in Tanzania. Phylogenetic analysis of ticks and patient samples has suggested the presence of a novel borrelial species showing closer resemblance to New World species rather than those present in Africa. The role of this spirochaete in clinical disease is yet to be determined.

Molecular mechanisms of antigenic variation were also being studied, with different variable membrane protein genes being described.

The need to have accurate surveillance to determine the size and extent of TBRF was highlighted. Although funds for this are currently not available, local data collection from selected regions could be collated. This together with further work to understand both spirochaete-vector and host-spirochaete relationships will allow investigations on possible intervention strategies. Full details of this meeting can be viewed at www.mvumi.org.

Sally J Cutler and Alison Talbert
Veterinary Laboratories Agency, Surrey

The 17th SAAFoST Congress and exhibition

Pretoria, South Africa, 1 - 4 September 2003

The 17th South African Association for Food Science and Technology (SAAFoST) International Congress and exhibition was held at the Council for Scientific & Industrial Research Conference Centre, which provided excellent conference facilities. The speakers included an impressive compilation of international leaders in the field of Food Microbiology and Food Technology from Australia, the USA, New Zealand, the UK, Switzerland and South Africa. All poster contributors were afforded an opportunity to give five-minute oral presentations. Proceedings started with pre-congress workshops on the first day and the main congress opened on the second day with a keynote address from Dr. Robert Buchanan from the USFDA. The presentation entitled *'Food Safety for the new Millenium'* discussed the impact of international trade and advances in Food Technology on the emergence of new food safety concerns. On a more positive note, advances in food technology and disease surveillance have enhanced the ability to anticipate and respond to new microbiological food safety challenges.

Other highlights on the second day included addresses by the IUFoST President Dr Alan Mortimer (Australia) on world-wide trends in the food industry, Prof A van Holy of the University of the Witwatersrand on HACCP in the food industry and the role of air conditioning and ventilation in HACCP. The day concluded with talks on global safety requirements and predictive microbial modelling as a tool in the food industry.

The third day was a session on risk analysis and opened with a discussion on risk assessment, risk management and risk communication procedures. Other papers presented included: Quantitative microbiological risk assessment, GMO technology and its impact on food testing, and the feasibility of use of non-thermal technologies such as high hydrostatic pressure, irradiation, pulsed electric fields and antimicrobials including bacteriocins in the sterilization of foods.

On the fourth and final day I attended a parallel session on Dairy Science and Technology. Presentations included: the use of natural protectants such as bacteriocins in the dairy industry, extended shelf-life milks (Tetrapak aseptic packaging), probiotic bacterial in fermented dairy products (M Nagle, Chr Hansen, UK), the lactoperoxidase system in milk, and emerging microbiological hazards in dairy processing.

I presented two posters on the applicability of predictive modelling to *Listeria monocytogenes* growth in sous vide products and the effect of storage and processing temperatures on the microbiological status of sous vide extended shelf-life foods, and benefited from the interaction with fellow Food Microbiologists and the exposure to current developments in the field. I would like to thank SfAM for making attendance at this congress possible through an award from the President's Fund.

Hilda Nyati
National University of Science and Technology, Zimbabwe

The 12th International Workshop on *Campylobacter, Helicobacter* & Related Organisms, (CHRO)

Aarhus, Denmark, 6 - 10 September 2003.

The 12th biennial meeting of this workshop was held for the first time in Denmark, in the Viking-founded city of Aarhus, which was extremely convenient for me, having just recently moved from Northern Ireland to work in Copenhagen! The Scandinavian Congress Centre provided a highly efficient environment for the congress, able to accommodate both large plenary sessions and smaller workshops alike. I was glad to have the opportunity to experience the Latin quarter of Aarhus, an interesting contrast to the modern setting of the congress which allowed me to catch up with many friends who I had not seen in two years or more. Aside from the socializing we were, of course, gathered in Aarhus with the anticipation of learning a great deal about Campylobacters, Helicobacters and related organisms. This workshop must be considered the world's foremost gathering of scientists working on these organisms, with traditional disciplines such as epidemiology, pathogenesis, and diagnostics represented alongside emerging disciplines such as bioinformatics and genomics. I was especially pleased to see a new session on micorarrays and proteomics, since this reflects the emphasis on my new project, and it was a great opportunity to speak to people who were already working with these techniques. Other than this, my main interests were in the "Typing and molecular epidemiology" workshop, and the session on "Taxonomy and new and emerging pathogens," for both of which I was involved in presentations describing work conducted in my previous research at Queens University of Belfast.

The congress kicked off on Sunday with an enlightening plenary lecture from Dr. David Ussery, who described methods used at the Danish Technical University for analysing and comparing microbial whole genome sequence data. The number of genomes being sequenced is increasing on something approaching a logarithmic scale. This is reflected at the level of campylobacteria, for which the first sequence (*H. pylori* strain ATCC 26695) was published in 1997, the second (*H. pylori* strain J99) in 1999, and the third (*C. jejuni* NCTC 11168) in 2000. The *H. hepaticus* genome was published shortly prior to this conference, the *Wolinella succinogenes* genome shortly after, and currently there exist sequencing projects for *C. jejuni* strain RM1221 and for at least four other *Campylobacter* species. Clearly, it is essential that there are effective methods for mining this genomic data, whilst publications along the lines of, *"Revised annotation and comparative analysis for bacterial genomes.."* further support the need for effective analytical tools.

The plenary session was followed by the new session on "Microarrays and proteomics," which left me somewhat baffled at the number of different variations in place with respect to both methodology and analysis of data. I particularly enjoyed the presentation by a group from Norwich, who thoroughly explained the rationale behind determining cut-off values in intensity for determining conserved and variable genes. The whole session was reminiscent of "Molecular typing" sessions at previous conferences, where individual laboratories originally developed their own methods, and gradually, the need for standardisation became more and more obvious. Microarray technology is still in its infancy, so I imagine that it is important for different methodologies to be tested, before it might or might not be possible for standardisation to occur.

The following day saw some reorganisation, as the post-lunch plenary speaker, Professor Jon Cooper, found himself returned to Copenhagen airport when his plane developed engine trouble. The workshop sessions were brought forward to cover for his unfortunate delay, and I attended the session on, "Taxonomy and new and emerging pathogens." The highlight of this was the description of a new *Arcobacter* species from broiler carcasses, although it was suggested that the intended name for the new species (named after poultry) should be changed when it was realised that the contamination is clearly from an external source! Following this, the plenary speaker gave a very interesting insight into commercial diagnostic micro-chip methods for bacterial pathogens, despite being clearly shaken from his recent airborne experience!

Tuesday provided an interesting plenary session on risk assessment to evaluate options for reducing campylobacteriosis. This was presented by Arie Havelaar. I found the talk highly informative, not least because he took the trouble to explain the various statistical methods used in evaluating risk assessments. Risk assessment made accessible to microbiologists! A novel experience! This was followed by a session on "Typing and molecular epidemiology," at which I also presented. The chairman, Martin Maiden, summarised the session well when he said that it was clear some sort of consensus had been reached on suitable typing methods and that results from field studies were the main thrust of the session, rather than description of ever more different numbers of typing methods.

The final day of the conference started with a civil, but lengthy debate on use of antibiotics in animals. No conclusion was really reached, but it allowed a thorough airing of all opinions. This was followed by a session on Bioinformatics and genomics, and one on the Epidemiology of Campylobacter. Whilst I had hoped to attend both, I chose the former option, and the highlight for me was the talk by J Solnick on quantitative analysis of *H. pylori* gene expression in the human stomach. His description of calculating relative gene expression, based on the need to know that primer pairs are equally efficient and gave me some good ideas for examining the efficiency of hybridisation of different oligonucleotide probes on the intended microarray system I will be using in the future.

All that remains is for me to thank SFAM for providing funds to attend this prestigious conference, and for allowing me to gain a good insight into the new technology in which I am now involved.

Clare S Harrington

Notes on Medical Microbiology

M C Timbury, A C McCartney, B Thakker & K N Ward. 2002. Churchill Livingstone, ISBN 0 443 071640. Price £25

Microbiology and Infection:

Second edition, T J J Inglis, 2003 Churchill Livingstone, ISBN 0 443 070954. Price £32.00

reviewed by Simon Hardy

IF YOU NEED TO recommend compact microbiology texts for medical students you will be interested in these two books. Timbury *et al* is a merger of two long-standing texts, '*Notes on Medical Virology*' (which had reached its eleventh edition) and '*Notes on Medical Bacteriology*' (fifth edition). The book is arranged into sections based upon traditional medical microbiology texts. The chapter's titles are by specific bacterial infections (e.g. 'enteric fever', 'tuberculosis and leprosy') and by genus. The infections in question are dealt with under the following headings: 'Clinical features', 'Diagnosis', 'Treatment', 'Epidemiology', and 'Control', and in many instances are covered in less than two sides. At 600 A5 pages it is going to be difficult to get into the lab coat pocket but is tightly packed with distillations of the clinical and laboratory features of microbial infections.

'Notes on Medical Microbiology' is targeted towards revision (especially if you have a photographic memory). The drawback is that reader must have acquired an understanding of principles and themes of infectious diseases elsewhere. The introductory chapter on bacterial physiology did give some cause for concern. The description of the cytoplasmic membrane as a "trilaminar structure formed of proteins buried in a phospholipid bilayer.." is less than clear. It is perhaps unfair to target the introductory chapter on bacterial physiology in a book that seeks to serve as a *vade mecum* of human microbiology. With restrictions in time in the curriculum for the teaching microbiology it is not surprising that such textbooks focus on the infections themselves and for this the book is terrific. It is comprehensive in that the catalogue of organisms that cause infections in man are covered (including fungi and 'parasites') and its breadth of scope will provide a valuable resource for post graduate clinical experience. The book has good colour photos but only 6 further texts for recommended reading.

Medical Microbiology

Editors: D Greenwood; R C B Slack; J F Peutherer. 16th Edition. Churchill Livingstone. Edinburgh. 2002. ISBN 0-443-07077-6. pp 709. Price £34.99

reviewed by Eric Bridson

THIS EDITION FOLLOWS 75 years of uninterrupted publication of the original Mackie & McCartney *'An Introduction to Practical Bacteriology as Applied Medicine and Public Health'*. 1925. The reviewer purchased his first copy of M & M in 1944, it was a second-hand 6th edition 1942. In latter years this book divided into two separate publications *'Medical Microbiology'* and *'Practical Medical Microbiology'*. Professor David Greenwood is a safe pair of hands to carry this book on. He and his two co-editors have selected 52 distinguished contributors to cover the wide-ranging sub-divisions of medical microbiology. The multi-contributor format for large textbooks of broad-based subjects, is increasing in popularity with readers. Each expert has to attractively present current essential data within a relatively few pages.

This concentrates the minds of prolix writers. In this book, within 700 pages, the contributors have packed an enormous amount of update information. All of it in an assimilatory form with diagrams, figures, illustrations and key references. A new departure is Internet reference sites, offered by editors and contributors. Whilst such sources are topical, they are variable in quality of content and lack the authority of a peer-reviewed publication.

The contents of this edition follow the conventional arrangement: microbial biology; infection and immunity; bacterial pathogens and associated diseases; viral pathogens and associated diseases; fungal pathogens, parasitic infections and medical entomology; diagnosis, treatment and control of infection. In spite of new antimicrobials, microbial infections have not been defeated in first world countries. Septicaemia still kills more than 1200 patients a year in UK hospitals. Earlier diagnosis is imperative, late administration of antibiotics can be as lethal as the loss of protein C and subsequent blood clotting. Whilst the rate of production of new antibacterial agents has fallen, antiviral agents have increased. Fourteen antiviral agents are in current clinical use and another 14 antiretroviral agents are available, some of which are active against HIV.

Modern medicine has produced treatments that interfere with normal host defence mechanisms, creating new iatrogenic diseases. Inflammatory reactions, humoral and cell-mediated immunity are well covered. Bacterial pathogens and their associated diseases are described with up-dated references and clear tables. The section on viral pathogens and associated diseases was written before SARS (severe acute respiratory syndrome) emerged from China. It was noted, however, that human coronavirus (HCoV) can cause severe respiratory tract infection in the elderly and very young.

Good illustrations, some coloured, appear in the section on fungal pathogens, parasitic infections and medical entomology. Diagnosis, treatment and control of infection gives broad descriptions of the investigations required to diagnose infections of the major organs, whilst diagnostic procedures cover collection, transport and examination of specimens taken. This book does not lack essential practical details where it is essential.

The strategy of antimicrobial chemotherapy is briefly described with details of common sites of investigations and the antibiotics of choice to treat infections. The multifactorial nature of epidemiology and the control of infectious outbreaks is discussed. It is a sad fact that in this antibiotic era, poor staff compliance with simple hygiene rules causes a number of these problems. Differentiation between self-infection and cross-infection is discussed. High security isolation units, designed to keep bacteria within or without the units, must be constantly monitored to test the

efficiency of maintaining either objective. Immunization is clearly and succinctly updated. The author has stressed that in protecting the traveller, practical simple advice on eating, drinking and protective clothing can be of more value than typhoid or hepatitis immunization.

Is this book good value for money? The answer is 'Yes'. Could it be improved? Yes, by the addition of colour. The malarial parasite section shows the value of colour in this book. Spot or false colour is not expensive. Perhaps the editors and publishers should look at the modestly priced *'Biology of Microorganisms'* 9th Edn. 1999. Prentice-Hall Inc. to see the full effect of colour in a microbiological textbook.

Bioremediation: a critical review

Edited by: Ian M. Head; Ian Singleton and Mike G Milner.
301+xii. ISBN 1-898486-36-0. (2003)
Price £90.00/ US$180.00. Horizon Scientific Press. United Kingdom
reviewed by Russ Grant

THIS BOOK PROVIDES a modern approach and treatment to the subject issues in bioremediation today. Covered in this publication are chapters on the history and current state of bioremediation, microbiological studies for the bioremediation process, ecological theory with regards to bioremediation, the geochemistry and hydrology of groundwater bioremediation by natural attenuation, stable isotope fractionations for monitoring bioremediation, site assessment and ecotoxicological testing, the bioavailability of polycyclic aromatic hydrocarbons (PAHs), permeable reactive barrier technologies, anaerobic bioremediation, and finally a discussion on whether microbial inoculants for bioremediation are 'snake oil or panacea?' — whether expensive and useless or the universal solution.

The book is written in chapters in a style similar to scientific reviews. The information presented is very thorough in the subject matter that it covers, with large, useful reference sections with up to date citations. Whilst the latest citations will invariably refer to work that has been carried sometime ago, the contents are the most up to date of many of the books I have seen. The writing in each paper, by different authors, remains at a high standard throughout with very little supplementary material in the chapters. Whilst this book is a collection of specially commissioned articles, it is informative and interesting enough to read through piece by piece although some chapters will probably not appeal to everyone. The only minor gripe with the presentation of the book is with the graphical figures which are unfortunately not standardised. This takes nothing away from the information that they display but does draw attention to the way the book was produced. Some figures also appear slightly fuzzy from being enlarged and one is not actually referenced in the text. However these are all minor points that I had to look hard to find.

I do not consider many of the other texts on biodegradation and bioremediation unapproachable, but I found this book very approachable, perhaps in part due to my own interests in the fields that it covered. From the contents page the book comes across as a text on the future aspects of bioremediation, rather than the just as useful, but usually less enticing specific books concerned with a particular group of compounds or type of biodegradation / bioremediation, although no less would be expected from a book of critical reviews. The book does not try to do too much and cover every available topic in the subject and thus maintains a focused approached to the selected aspects. Indeed, the back cover description states almost as much.

At £90 this text will not be cheap enough for those readers with a passing interest in bioremediation today, but is instead more suited to those directly involved with the subject area or in closely associated fields.

In conclusion this book presents the current issues and topics applicable to bioremediation today very well and will be a useful addition to not only those working in bioremediation, but to libraries as an interesting guide into bioremediation today.

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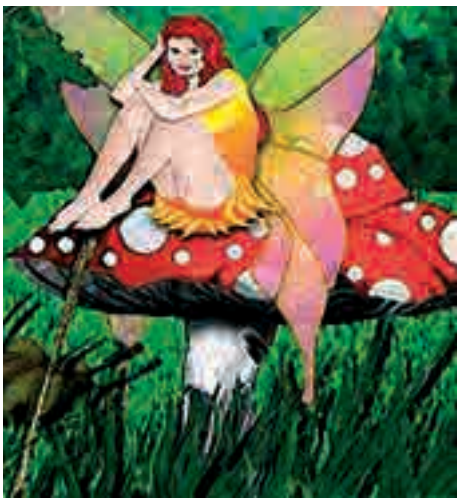
Magical mushrooms, mischievious moulds

George W. Hudler
reviewed by Ferenc Varga

THE TITLE OF THIS BOOK is also the background material of the popular mycology module given by George Hudler, Professor of Plant Pathology at Cornell University. The book entertainingly conveys the sense of fun for which both the module and the teacher are renowned, while providing a mycological counterpart to texts such as Bernard Dixon's Power Unseen or Postgate's Microbes and Man.



You know it's going to be a good read as soon as you start to read the preface, in which Hudler recalls his own introduction to plant pathology seated in his University classroom:

"..the Professor strode to the front of the room. Unceremoniously he dropped his notebook on the lectern and proceeded to issue a stern warning to those of us who persisted to squander our meagre funds at the local tavern: we were all doomed to short, excruciatingly painful lives. 'It's not the beer that will get you,' he said. 'It's those free peanuts...Your liver just can't take such abuse forever!"

Chapters cover the common areas of interest: medicinal moulds, hallucinogenic mushrooms, wood decay, food spoilage etc., and these are further subdivided in utter simplicity and excellent readability into collections of compelling yarns which absorb the reader on a fascinating

rollercoaster ride through the author's fungal theme park.

This book should essentially appeal mostly to biological science undergraduates and other fungi-curious lay readers, but most of the information should already be familiar to those readers already well versed in matters mycological. Most of the lecture room favourites are there: the grandiose means of spore dispersal by the higher fungi; wet rot devastations of property; ergot sclerotia causing losses of body parts; the misery caused in nineteenth century Ireland by potato blight; the discovery and development of penicillin; insect parasitism by *Entomophthora* etc. There are, nevertheless, surprises in store for other readers still enchanted by this remarkable and important group of microorganisms — perhaps the link between ergotism and historical bewitching scandals such as those at Salem, central Europe and elsewhere. I for one will think twice before laying wood chips around my garden to combat weed growth thanks to *Sphaerobolus stellatus!* The unyielding, adhesive slime surrounding the spores of this fungus have been responsible for ruining the paintwork of many a car or house. Hudler's special competency in wood decay probably provides most of the fresher material found in the book. For the more serious student, however, the book will entice but might seem to fail to provide enough required detail; for example, descriptions of ascomycetes and basidiomycetes by the increasing levels of complexity of spore dispersal mechanisms are not systematically addressed. However, in such cases, the author has provided excellent references for further reading.

If the contents are pitched toward the beginning student or lay reader, the book perhaps best succeeds in the simple approach taken toward the classification and nomenclature of the fungi. This is done less from a taxonomic but more from a pragmatic viewpoint, which strives to explain how the different classes fit into the natural world. This approach succeeds to such effect that the text flows beautifully where many another would get bogged down in relatively tedious and unnecessary detail. The result is that the reader, rather than being confused is appetised for all that follows, often in the vernacular, covering what fungi do and how they do it.

Armed with this basic understanding of classification, the reader treads the hazy line between scientific knowledge and the world-around-us via some captivating storytelling. Along the way there is many a convenient explicit photograph or diagram to support the text for the general reader, but then again, perhaps less so for the more serious student for whom some pictorial description of, for example, perithecia, cleistothecia etc., would have served usefully. Never mind, these are in abundance in countless textbooks!

There is the odd occasional misleading or contentious snippet of information in the text: wood does not have to be damp to become rotten. Dry rot fungi (as alluded to elsewhere in the text) produces the dampness ahead of its hyphal tips during the course of its growth: 'Sick building syndrome' applies just as equally to *Legionella* and other bacteria, viruses or pollen as much as it does to a motley collection of mould spores in air conditioning systems. Also, however convenient and apparent an explanation as it sounds, I do not think it has not been established that the primary purpose of antibiotics is, like bacteriocins, to discourage potential competitors from getting more than their share of nutrients. For me, the chapter dedicated to brewing, or alcoholic fermentations — probably the most beneficial microbial by-product in the minds of many a reader — was, by comparison, put together quite out of tune with the rest of the book and here I would, for example, contest that Gewürztraminer (strictly speaking, a grape variety) and Vouvray (a relatively undistinguished natural dry white wine) serve as examples of wines produced from *Botrytis* rotted grapes. Sauternes, Barsac or Hungarian Tokaj aszú — the favoured tipple of *Le Roi Soleil*, Louis XIV, who is reported to have drunk a bottle a day for a good part of his reign — are all more likely representatives with fascinating tales to tell themselves. Continuing on this theme, the origins of Botrytis wines (quoted in the text as being from Germany in either 1716, 1775 or 1783!) is more myth than fact - the reign of Louis XIV ended in 1715, hence Tokaj would seem to predate this, and in fact attributes its origins to 1650 and a delayed harvest following a Turkish onslaught.

These minor snippets do not detract from what is an excellent read enriched with many entertaining anecdotal gems. Examples of these can be found in the "bookshelf" paragraphs at the end of many of the chapters, in which extracts are taken from fictional works by popular modern writers manipulating (with varying degrees of accuracy) the factual material covered. From Sue Grafton's *'I is for Innocent'* (poisonous mushrooms) to Graham Greene's *'The Human Factor'* (mycotoxins).

By way of conclusion, I can only strongly recommend *'Magical mushrooms, mysterious molds'* as a very good value paperback for the lay reader or beginning student. Or for the rest of us who may have forgotten what got us hooked on this subject in the first place! It is a tall order to be novel, absorbing and creative when writing populist fungi texts because so many good ones have already been written. Hudler nevertheless succeeds in doing this in style. Buy it!

Biotechnology From A to Z

Second Edition. William Bains.
Oxford University Press. 1998.
ISBN 0199636931
reviewed by Louise Fielding

THE AUTHOR OF THE BOOK says: *'This book is not a textbook,'* clearly stating that it is a reference tool or a glossary of terms aimed at giving an insight into the terms used in the rapidly progressing field of biotechnology. It is aimed at those who are not experts in the field, although some knowledge of the basic sciences is useful. It was produced five years after the first edition and includes more than 70 new entries and revisions to existing entries.

The format of the book follows an alphabetical structure, rather than expanding on concepts from one section to the next. An index is included so that cross-referencing between entries is possible. In places, the reader is also referred to other entries in the text to extend the discussion for a particular topic. Entries are wide ranging, as is the nature of biotechnology, and include some of the basic science (protein structure and stability, luminescence, the immune system), concepts (enzyme immobilization, animal cloning, micropropagation) and techniques

(affinity chromatography, microscopy, molecular electronics). A range of microorganisms important in biotechnology is also covered, including bacteria, bacteriophages and fungi.

To aid the less scientific or the student just embarking upon their studies, some very basic concepts are also discussed. These include the terms assay, automation, fermentation and mutation. There are also a number of very useful illustrations including diagrams of equipment, flow diagrams for processes and pictorials to explain concepts. Although they are basic diagrams (no electron micrographs or digital images are included) they are clearly constructed and well presented and add interest to the text as well as increasing the understanding of the reader.

It is a valuable tool for students for whom biotechnology forms a minor part of their studies, as it does not cover any aspect of the discipline in depth. As such, the text is not designed to be read as an authoritative textbook on biotechnology but to be referred to as and when the need arises when studying this subject. The book fulfils its aim of providing a basic, understandable text and can be useful for students of molecular biology and biotechnology, as well as those who teach in these areas as the definitions and explanations are clear and well illustrated. The only potential concern is that this edition is now 5 years old and may soon be in need of revision into a third edition due to the pace at which this area of science is moving.

Drinking Water and Infectious Disease

Editors: Paul Raymond Hunter, Mike Waite and Elettra Ronchi. CRC Press. ISBN 1843390272

reviewed by Louise Fielding

THE SUBTITLE to this book is *'Establishing the Links.'* Water is a vital ingredient in everyday life. We know that in the less developed countries, especially of Asia and Africa where famine is a significant threat, that safe drinking water cannot be taken for granted. In the UK, we tend to assume that what comes out of the tap will be safe to drink. This book concentrates on the developed world and highlights the problems that we face regarding drinking water safety.

The history of the problems and concerns surrounding drinking water are well outlined in the foreword and this book was written as a result of an OECD expert group meeting, *'Approaches for Establishing Links between Drinking Water and Infectious Disease'* held in Basingstoke, UK, in 2000.

The book is divided into three sections, each comprising a number of chapters, which deal with specific issues, either practical, such as surveillance systems or more theoretical such as the use of seroepidemiology to investigate waterborne diseases. Each chapter is written by one or more authors from an academic, public health or corporate background. The authors come from around the world so the book has a truly global perspective. Each section of the book is preceded by an introduction from the chairperson from the Basingstoke meeting, which outlines the content of that section. There are also some general concluding remarks, which bring together the main points of the section.

The first section looks at surveillance of waterborne disease. The first chapter outlines surveillance systems and the following three chapters extend this to deal with local, National and International surveillance. There are substantial data regarding outbreaks of waterborne illness presented and also a number of schematic diagrams to explain the surveillance process.

The second section is concerned with investigations of outbreaks of waterborne disease and comprises seven chapters. The first of these outlines a systems approach to investigation and control, illustrating the theory with a case study of an outbreak of cryptosporidiosis, following the path the investigation took. The following chapter emphasises the importance of the early detection of waterborne disease outbreaks, outlining methods which can be used such as statistical techniques and artificial neural networks. Microbiology is the subject of the next two chapters which cover the detection methods and includes a brief case study from Finland (NLVs). Engineering is considered in the next chapter as a crucial step in water safety is the physical environment. A brief description is given of the multiple barrier approach to water safety followed by three case studies from the US. The final two chapters in this section deal with outbreaks of waterborne disease in the US and *Cryptosporidium* in England and Wales.

The third section of the book is the investigation of sporadic waterborne disease as opposed to outbreaks. This section deals mainly with the systems that are available for such investigations for example, use of existing surveillance-based data, time series analysis, case-control studies and intervention studies. This section also introduces prospective studies of endemic waterborne disease in developing countries.

The book is well written and clearly presented with all chapters being subdivided into sections, which are indexed at the beginning of the chapter. Substantial use is made of figures and tables, detailing outbreak data and specific flow diagrams of processes. It is a very accessible text, written and presented in an interesting way. Although a target readership is not clearly identified, this book will be useful for practitioners in the water supply industry as well as those in allied industries such as food and drinks vending.

DNA virus replication

Editor: Cann, A J. Oxford University Press, 2000. Price £35.00.

reviewed by Tim Mason

THE EIGHT CHAPTERS of this clearly written text cover a good range of the viruses one would expect to see in such a work. These include hepatitis B, papillomavirus, herpes viruses, Epstein-Barr and adenovirus.

The chapter on the hepatitis B virus, provided a thorough update of the developments in the subject. The author provides an excellent overview of the infection process at the molecular level and follows this with a consideration of the problems of finding suitable experimental systems in which to study the virus and its problematic reverse transcriptase. The chapter concludes with considerations of virus assembly and of the enigmatic HBx protein. The impression given by this first chapter is that the text will be readily understood by, and of interest to, second and final year undergraduates on medical microbiology and related courses. This is unfortunately misleading.

Whilst the title of the text may be *'DNA virus replication,'* the back cover perhaps more accurately describes the contents as *'a comprehensive analysis of protein-protein interactions in DNA virus replication'*. This becomes apparent in the second chapter where general information on the replication of the papillomavirus is secondary to a detailed consideration of the roles of individual proteins in the replication process. The account given by the author is a commendably lucid one.

This style of approach continues throughout the text, with each chapter providing fascinating insight into particular aspects of the replication process. It is consistently well written and has a clarity which, although the illustrations are sometimes rather complex, is to be commended.

Of particular interest was the chapter on cytomegalovirus latency, which gave an interesting assessment of how this virus is maintained in a delicate balance between its latency and the induction of cell lysis. The existence of a delicate balance was exemplified too in the consideration of the attempts of a CD8 cytotoxic T lymphocyte to kill an adenovirus infected cell in the chapter considering the regulation of apoptosis by this virus.

The index was a singularly half-hearted affair of half a page. For a text likely to be used for reference, this is a significant weakness, especially as a comprehensive index can nowadays be produced easily. This is however a minor criticism of a book which serves its target audience well. I would need however to reappraise my initial view of the target audience and propose it as suitable for virologists and those studying relevant aspects of molecular biology, especially DNA replication and protein-protein interaction. For this audience, the cover price represents particularly good value for money and it deserves to be purchased by many libraries and some individual researchers. For the wider undergraduate audience, the text has less appeal.

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Microorganisms in Foods 7: Microbiological Testing in Food Safety Management International Commission for the Microbiological Specifications of Foods (ICMSF)

Kluwer, New York 388pp.
ISBN 0-306-4762-7.
Price £88.50 €144.50/ US$ 125.00.
reviewed by Martin Adams

THERE IS NOTHING LIKE A provocative assertion to get people going: *"End product testing is the microbiological equivalent of a comfort blanket..' Discuss"*. But this one at least should no longer result in the sorry spectacle of food microbiologists rolling around in the dust in a flurry of fists and expletives. For here we have a book that brings illumination to the debate and goes a long way to providing a balanced and well-informed answer to the question.

Since its constitution in 1962, ICMSF has played a central role in the history and development of food microbiology through its excellent series of publications. This book is in part an updating of earlier volumes notably Part I of *'Microorganisms in Foods 2'*, last published in 1986. In it, ICMSF described the statistical basis of sampling plans and made the point that while such plans could be useful at port of entry when little is known of a product's history, no sampling plan could ensure safety. This was important in highlighting the limitations of systems to control food safety based on inspection and compliance with hygiene regulations coupled with end product testing and a subsequent volume went on to describe the value of strategies based on intervention at source during production and the use of HACCP.

This volume synthesises and updates material from these earlier publications — demonstrating once again how HACCP and good hygiene practices (GHP) provide much greater assurance of safety than microbiological testing of products. It does however identify where, and under what conditions, microbiological testing can still play a useful role. Thus there are chapters introducing the principles of sampling, attribute and variables sampling plans, and discussion of topics such as tightened, reduced and investigational sampling, sampling of the environment and sample handling and analysis.

The book also introduces the use of the food safety objective (FSO); a concept which has emerged from risk analysis as the translation of an agreed risk level into a defined goal for food safety control systems such as HACCP. Thus there are early chapters on Evaluating Risk and Establishing Food Safety Objectives, Meeting the FSO Through Control Measures and the FSO crops up frequently in other chapters. Chapter 5 for instance provides a useful comparison of the characteristics of an FSO and a microbiological criterion.

The final four chapters look at aspects of the risk analysis for four different hazards: aflatoxin in peanuts, *Salmonella* in dried milk, *Listeria monocytogenes* in cooked sausage and *E. coli* O157 in frozen beefburgers. In each case an example of an FSO is presented and discussed in terms of control measures to achieve it. There is also description of possible acceptance criteria: sensory, chemical and physical, as well as microbiological, to be applied when nothing is known of the product's history. These can emphasise the inadequacy of microbiological criteria as a control measure and provide powerful evidence to confirm the statement at the top of this review. For example, the FSO for *Salmonella* in dried milk to achieve less than 1 case per 100,000 per annum is given as <1 cfu 100kg^{-1}, whereas the most stringent sampling plan recommended for dried milk intended for high risk populations would have 95% confidence of detecting *Salmonella* when present at a level 1cfu 278 g^{-1}!

I have to admit that in some places I did not find this an easy read, in marked contrast with most of the earlier ICMSF volumes, and sometimes there seemed to be an over reliance on examples from the U.S.A.. These are relatively minor quibbles however, as the book is an essential purchase for any library, institute, company or laboratory concerned with the control of microbiological food safety.

Microbiology: Principles and Explorations, 5th Edition, 2002

Jacquelyn G Black. John Wiley & Sons Inc, New York. ISBN: 0-471-38729-0
Price £32.95

reviewed by Hilary Dodson

The book promotes that 'microbiology is a current, relevant, central science that affects all of us. The goal of the text is to offer a sense of history of this science, its methodology, and its many contributions to humanity and the many ways in which it continues to be on the cutting edge of scientific advancement. In this edition, boxed essays have been newly organised to help students recognise the type of application being presented. This is very much an American text so does not always consider microbiological problems from a UK point of view. The style of the whole book is informal with the aim of making information accessible.

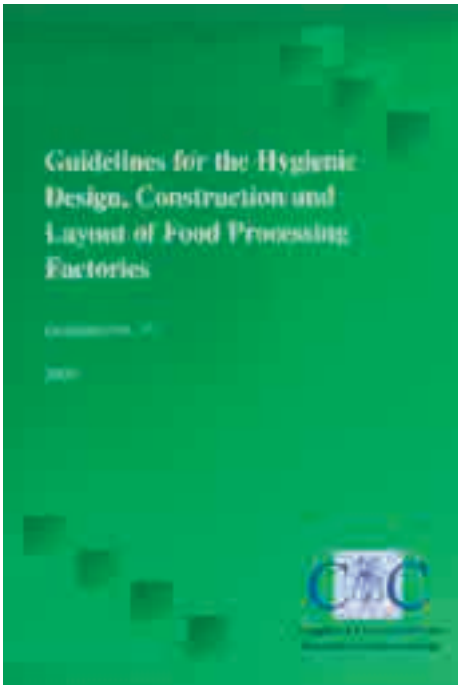
Although divided into the usual units and chapters there are some interesting devices to make learning as easy as possible. The title page for each chapter has a photograph and short section of 'interesting facts' that are likely to make the reader want to know more about the topic. There is also a series of bullet points entitled *'Questions We'll Explore'* and a section called *'Background Basics'* which refer the reader to other chapters or sections of the book that they need to know in order to understand the material being presented in that chapter.

Each chapter is well subdivided and there are clear figures and tables which assist in understanding the concepts being presented. Most chapters are richly illustrated with a wide range of relevant photographs and micrographs including those that illustrate disease states (the gory pictures much beloved by some students).

There are numerous text boxes containing fascinating snippets of information such as: *'Try it,'* suggesting practical work; *'Exploring the Microbial World,'* giving information on the unusual habitats colonised by microbes and '*Biotechnology,'* with information in this field. The boxes I found most engaging were the *'Applications to Health.'* The titles of these ranged from *'Need a Blood Transfusion?' 'Call on a Genetically Altered Pig'*, to *'Involuntary Drunkenness'* due to yeast colonisation of the human digestive tract and *'Light of My Death'* relating to how, in the early 1900's before refrigeration, the distortion of a corpse was prevented by the undertaker making small holes in the body and applying a lighted candle to ignite the escaping flammable gases. At the end of each chapter there are a few questions in a section called *'checklist'* followed by the key points from this chapter. There is also a series of multiple choice questions and some questions that require critical thinking. Luckily for learning purposes there is a set of answers at the back of the book. If you still have not had enough testing at this point, there is also a web address for further information to assist in answering some more thought provoking questions on the chapter topics.

The book finishes with some useful appendices, a glossary and index. Inside the covers are two rather unexcitingly presented tables. At the front is a factual table of diseases and the organisms that cause them whilst the back has pathogens and the diseases they cause. These tables would not have tempted me to open the book further, which is a pity since there is excellent visual material and it contains fascinating facts indicating the relevance of microbiology to the present times.

Overall the material in this book is current, relevant and well presented. It follows the maxim: tell them what you are going to say, say it, then tell them what you have said. The good illustrations add significantly to the written material. My main reservation is that the book is written almost exclusively for the American student and their assessment systems. A range of illustrative examples from Europe, along with altered emphasis on certain diseases would make it a much more widely useful text for this country.



Building and refurbishing food production areas

Two new guides from CCFRA will help food construction companies building or refurbishing premises to avoid costly mistakes an better assure the safety of their food products.

Produced with the close involvement of food and construction industry specialists, *'Guidelines for the hygienic design, construction and layout of food processing factories'* (CCFRA Guideline No. 39) looks at the food hygiene related issues associated with building, adapting or refurbishing a food factory as a whole. The accompanying *'Guidelines for the design and construction of walls, ceilings and services for food production areas'* (CCFRA Guideline No. 41, second edition) looks at the construction principles for walls, ceilings and utility services for food production areas, providing advice on construction of external and internal walls, preparation of backgrounds, movement joints, finishes, coving and protection, openings including doors and windows, ducts, ceilings, services and pest proofing.

Both guides are aimed at anyone considering building, renovating or refurbishing food production areas and complement CCFRA's existing Guidelines in these areas.

Food packaging

A concise overview of food packaging and its role as an integral part of the food product — from preventing contamination to providing consumers with information — has been published by CCFRA.

As the latest in the Key Topics in Food Science and Technology series, *'Food Packaging: an introduction'* takes the stance that the package is an integral part of the product. It describes the main packaging materials: metal, glass, paper, board and plastics and the benefits and limitations of each and then looks at the main functions of packaging, covering its roles in food safety, physical protection, marketing and conveying information. This leads into an example-based discussion of the importance of compatibility between the food, the process and the package, and how this has culminated in developments such as modified atmosphere packaging and active and intelligent packaging. The growing role of environmental issues in shaping decisions on packaging is also considered. The broad coverage and heavy use of everyday industrially-based examples, together with the list of carefully chosen references, make the book an ideal starting point for anyone wishing to learn about food packaging and complement CCFRA's existing Guidelines in these areas.

New preservation technologies

A concise overview of new technologies and their role in food preservation has been published by CCFRA. *'New Technologies in Food Preservation: an introduction'* will help technical personnel who wish to become acquainted with the scope and potential of non-traditional approaches to food preservation.

After an introductory chapter on food preservation in relation to both safety and spoilage, it looks at novel developments with the established preservation technologies of heating, freezing and drying. It then works through high pressure processing, irradiation, power ultrasound and pulsed electric fields, in each case describing the principles and illustrating these with examples from products in the marketplace or the world of research and development. It is the latest in CCFRA's Key Topics in Food Science and Technology series.

Further information

■ Further details about the guides reviewed on this page and other CCFRA publications are available from Mrs Sue Hocking, CCFRA Publications Officer.
Telephone: +44(0)1386 842225
Email: pubs@campden.co.uk
Website: www.campden.co.uk

society for applied sfam microbiology

For more information about the Society, the benefits of membership, or *Microbiologist* please tick the appropriate box(es) on the reply card opposite, fill in your contact details, tear off the card and post it to us. To join the Society please visit the website where you can apply online.

Benefits of sfam membership

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

- **Reduced rates at Society meetings**
- **Access to the members areas of the Society website**
- **Generous grants and awards**
- **FREE access to three acclaimed journals**

Detailed information about all these benefits and more can be found on the Society website.

WEBSITE:

www.sfam.org.uk

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

CONTACT:

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membership options

■ **Full membership** gives online access to the ***Journal of Applied Microbiology***, ***Letters in Applied Microbiology*** and ***Environmental Microbiology***, copies of ***Microbiologist***, preferential registration rates at Society meetings and access to the members areas of the website.

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

■ **Associate membership** this new class of membership is open to all current and new Society members including existing Associate Student Members and Retired members and gives quarterly copies of ***Microbiologist*** and preferential registration rates at all Society meetings.

■ **Honorary Membership** of the Society is by election only and this honour is conferred on persons of distinction in the field of applied microbiology.

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

- Online access to the Society's three journals OR hard copies of the journals.
- Half page advertisement in each quarterly issue of ***Microbiologist*** (which can be upgraded to a larger size at very attractive discounted rates).
- Full page advertisement in the Members' Handbook.
- FREE banner advert on the Society Website with a direct link to your company site.
- Up to three members of company staff attending Society meetings at members' rate. (This means a 50% discount on non member registration rate).

Meetings

We hold two annual meetings. The January Meeting comprises discussion sessions with the opportunity to display posters on related work. The Summer Conference is held every July and comprises a main symposium, a poster session, the AGM and a lively social programme. We also hold occasional joint ventures with other organisations on topics of mutual interest.

Publications

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

Online journals

Synergy is an online service provided by Blackwell Publishing that gives Full and Student Members **FREE** access to the online versions of the Society's three journals: ***Journal of Applied Microbiology***, ***Letters in Applied Microbiology*** and ***Environmental Microbiology***. Members can register for this service at http://www.blackwell-science.com. Members can also submit papers directly to our journals via an online submission service.

For more information about Synergy or online manuscript submission, please visit the website.

Grants & awards

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

Full details of all the Society's grants and awards can be found on the website together with easy-to-use online application forms.

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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