Microbiologist

The magazine of the Society for Applied Microbiology ■ December 2002 ■ Vol 3 No 4

January meeting

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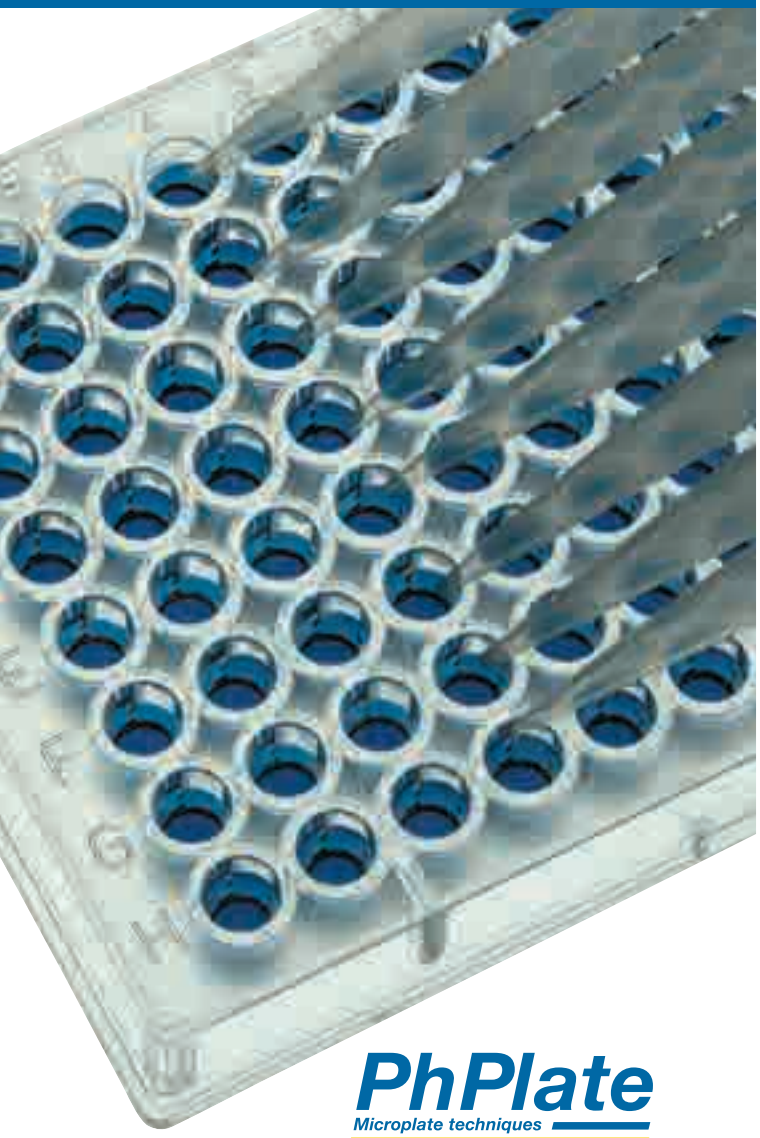

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Microbiologist

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REGULARS

MEETINGS

COVER STORY

FEATURES

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Friday 12 September 2003

How to submit material
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.

www.sfam.org.uk

Microbiologist - the new Society in-house magazine

Anthony Hilton introduces the new face of the Society magazine

HELLO, Merry Christmas and welcome to ***'Microbiologist'*** the new magazine of the Society for Applied Microbiology. Between these glossy covers you'll find all the usual information you have come to expect from the Society's newsletter plus special feature articles brought to life in glorious colour, and what better way to make the most of the availability of colour than to let pigmented microorganisms show us what they can do with it. In this issue, Maurice Moss reviews the common pigmented bacteria and the role pigments play in their survival and metabolism. Martin Adams and Pattie Hendrie develop this theme further - using a canvas of agar and a palette of pigmented bacteria they rediscover the lost art of bacteriology! If you have an artistic streak and fancy having a go with the pigmented-palette then why not send us some pictures of your masterpieces for our gallery.

I am happy to report that the website developments detailed in my previous columns are well underway and should be going 'live' over the Christmas period. Over the past few months the Society has worked closely with our website designer and programmers to create a site that will not only meet the needs of the membership but be something we can all be proud of, and the envy of other professional Societies.

Alan Godfree and Colin Harwood discuss in this issue the development of the Electronic Editorial Office for manuscripts submitted to JAM and LAM. Coupled with 'Synergy' online delivery of our journals this strengthens further our modern, forward-thinking society by embracing the available technology. Be sure to check out www.sfam.org.uk regularly for website updates.

I would like to express my thanks to our production company, Pollard Creativity, who have not only managed to put the first issue of ***'Microbiologist'*** together very quickly, but have also greatly improved the arrangement and presentation of the content.

For those who are interested in typography, the main fonts used in the magazine are ITC Century Book (this column) and Frutiger. Some of you will have noticed that the contents page is now divided into three sections: 'Regulars', 'Meetings' and 'Features' and that each section has a different colour. This scheme is continued throughout ***'Microbiologist'***, making it easier to find what you are looking for as well as clearly differentiating Society news and events from reports and meetings. Useful information (such as copy dates on this page) has been put into coloured boxes and article references and figures given more prominence by breaking them out of the features in which they appear.

Above all, colour reproduction has allowed us to finally get rid of the limitations imposed by printing in only two colours in the centre section which means that the presentation of our Meetings can be much improved. Of course, this also means that we now need much better images to accompany the articles that we publish and I would ask all our contributors to do all that they can to supply the very best quality photographs with their submissions!

I am personally very happy with how ***'sfam News'*** has developed recently and its successor, ***'Microbiologist'***, represents a significant investment by the Society into the future of our in-house magazine. I hope you enjoy reading it. □

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New Members

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

India

Professor A P Galhotra

UK

Dr L Bannock

Miss M Braoudaki

Miss A Drakoularakou

Ms K Lamb

Ms T L Noblett

Miss A Perry

Dr A Rickard

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Mr G Dichter

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the President's Column

The Hon President, **Dr Peter Silley** gets to grips with risk analysis and risk assessment

As this is my first contribution to '***Microbiologist***' as President I must express my thanks to all those who considered me worthy of the position. As I said at the Summer Conference this was a most unexpected honour and when I look back at the great names of Presidents past I feel somewhat like a little schoolboy standing alone in a Hall of Fame. I certainly hope that I can live up to the example of those who have gone before me. I also want to say a big thank you to my predecessor Professor Arthur Gilmour. Arthur has been responsible for overseeing many changes as the Society continues to move forward. I have known Arthur for many years since he first encouraged and guided me as a young microbiologist in Northern Ireland. That is probably a lead in to saying a little bit about where I have come from, as one member recently asked.

In as few a words as possible I can say, a first degree in Bacteriology from the University of Birmingham in 1974 and a PhD from Newcastle working with the anaerobic rumen flora. I have worked in the pharmaceutical industry with Cyanamid and Glaxo interspersed by my time in Northern Ireland at Queen's and the Department of Agriculture. In 1990 I moved to **Don Whitley Scientific** where in addition to the well-known instrumentation business we have developed a thriving contract research business primarily working on R & D projects with the agri and pharmaceutical industries. In 1999 we split off the consultancy side of this business and formed **MB Consult Limited** and I now split my time between the two. I also do some teaching at the University of Bradford. If you cannot always get hold of me it is probably because I am in the US. This year I have spent an average of one week per month across the pond.

This leads into the one point I really wanted to make in this my first "column". In a rapidly changing world we are continually facing new challenges and I am excited about what lies ahead for us as the Society for Applied Microbiology. We are looking to move with the times and provide our members with services which will help them in their everyday work as well as lobby for increasing support for the microbiology infrastructure.

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> the scientific knowledge, technology and equipment are not available to eliminate all microbial hazards from all foods

Change has introduced new concepts, open any publication today and there is almost certain to be mention of risk analysis. Dr Rosetta Newsome, Director of Science and Communications, of the Institute of Food Technologists writing in the WMRC Food Tech Business Briefing highlighted the fact that our current systems cannot deliver a risk-free food supply. She pointed out that the scientific knowledge, technology and equipment are not available to eliminate all microbial hazards from all foods and thus, risk analysis must be an essential part of science-based policies for food safety and public health protection.

One of three components of risk analysis, risk assessment provides the scientific basis for managing risks in an informed way. Although risk assessment suffers from limitations in current methodology and a pressing need for more and better data, it plays a vital role in international trade. The World Trade Organisation (WTO) requires countries to base their food safety measures on risk assessment, ensuring that their food safety requirements are scientifically sound and providing a means for determining equivalent levels of public health protection between countries. The Codex Alimentarius Commission (Codex), the international food standards-setting body of the World Health Organisation (WHO) and the Food and Agriculture Organisation (FAO) of the UN have developed principles and guidelines for conducting risk assessments.

The importance of risk analysis is further highlighted in the 2002 Annual Report of the FSA Research and Survey Programme which lists no less than 11 projects assessing risk.

I have just returned from the United States where the Centre for Veterinary Medicine of the FDA have just released draft guidance for industry in relation to the evaluation of safety of antimicrobial new animal drugs with regard to their microbiological effects on bacteria of Human Health Concern. The risk analysis methodology outlined in this document is based on the methodology described by the Office of International Epizootics (OIE) Ad Hoc Group on Antimicrobial Resistance. The risk analysis methodology described in the OIE document is tailored to address antimicrobial resistance in animals and includes hazard identification, risk assessment, risk management, and risk communication. Although it differs somewhat organisationally, the OIE approach includes similar steps to describe the risk assessment process as the risk analysis paradigm described by the National Academy of Science/National Research Council (NAS/NRC). The risk assessment process is comprised of a release assessment, exposure assessment, consequence assessment, and risk estimation. The risk estimation integrates the components of the risk assessment into an overall conclusion that provides a qualitative indication of the potential risk of the proposed antimicrobial new animal drug to human health. The overall risk estimation ranking is then used by FDA, along with other relevant data and information submitted in support of the NADA, to determine whether the drug might be approvable under specific risk management conditions.

As has already been said by others far more eminent than myself, microbiologists have been carrying out risk assessment for years. We now have to use somewhat new language as we move into a new era of risk assessment and risk management. As applied microbiologists we must ensure we play our full part in the development of this fascinating area which crosses the boundaries of science, politics and communication.

Peter Silley
Peter Silley is the Hon President of the Society and Research Director of Don Whitley Scientific Limited

Spongiform Encephalopathy Advisory Committee opens its doors

SEAC
Spongiform Encephalopathy Advisory Committee

SEAC was constituted in 1990 following the emergence of Bovine Spongiform Encephalopathy (BSE) in British cattle which brought with it the need to know more about the nature of the spongiform encephalopathies. Until then they had held little more than curiosity value for many biologists. SEAC'S purpose is to provide scientifically based advice to DEFRA (originally MAFF), the Department of Health, the Food Standards Agency and the various devolved administrations about spongiform encephalopathies, in particular BSE and varient Cruetzfeldt-Jakob disease (vCJD).

Before September 2001 SEAC meetings were closed and followed by a Press briefing. A change in policy means that meetings are now open to observers from the media and interested organisations, and members of the public so that the Committee can be seen at work and questions put to it. The most recent meeting was held on November 14th with the next one scheduled for February 11th 2003, probably in London. Attendance is on a "first come, first served" basis and anybody wishing to attend should first contact DEFRA SEAC Secretariat at Room 304, 1A Page Street, London SW1 4PQ. Telephone 020 7904 6000, or by email to: doug.wood@defra.gsi.gov.uk for an invitation. □

Margaret Patterson
Hon General Secretary

Further information is available on the SEAC website at **www.seac.gov.uk.**

Environmental Microbiology
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All Review and Mini-review articles published in Environmental Microbiology are available as PDFs to download free of charge from the journal website at www.env-micro.com.

FEMS Council meeting

5 October 2002 in Izmir, Turkey

Approximately 25 delegates attended the 29th FEMS Council meeting from the 37 National Member Societies. The main points arising from the meeting were:

- Peter Raspor (Slovenia) was re-elected as Secretary and Maurice Lock (UK) was elected to be the next Treasurer when John Norris stands down in 2003.
- The membership fee will be increased from 1.20 to 1.40 per member in each Society.
- The First FEMS Congress will be held in Ijubljana, Slovenia on June 29th - 3rd July 2003, see page 13 in this issue of ***Microbiologist***. The programme is wide ranging, including Symposia on Food biotechnology, Food safety, microbial diversity, metabolic engineering of microbes, emerging pathogens, modern diagnostic methods, development of new antibiotics against resistant bacteria, microbial stress, environmental microbiology, functional genomics and virology. Applications are invited for papers and poster sessions. Further details can be obtained at: www.fems-microbiology.org/congress2003.htm

S*f*AM members are encouraged to attend - we will be having a stand at the Trade exhibition so do call by and say hello! □

Margaret Patterson

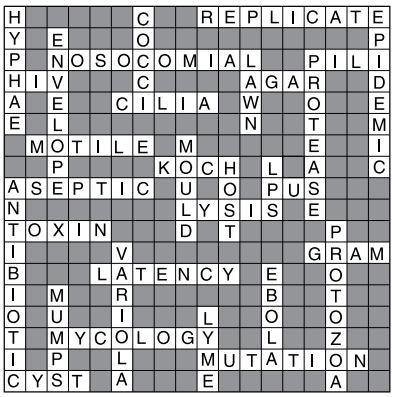
Clues

Down

1. Needed for viewing at 1000X.
2. An __ enovirus is a respiratory virus.
3. Prefix that generally refers to intestine.
4. Nutrient agar is a bacteriological __ -ium.
5. Environment studied by Winogrodsky.
6. Measure of the acidity in an environment.
7. Microbial infection of the periodontal tissues.
8. Protozoal disease.
10. Flagella vary in number and place- __
12. Total of all genetic material in a cell.
14. High-powered instrument for magnification (abbr).
16. Functional units of heredity.
20. Bacterial sphere.
22. Number of endospores formed by a bacterial cell.
26. Transmits Lyme disease.
27. Causes a sexually transmitted disease in humans.
28. Number of bacterial cells in a diplococcus.
30. Eukaryotic microorganism.
39. A cytoplasmic gran- __ may contain starch or phosphate.
32. Important to bread and alcohol production.
33. Bacterial appendage.
34. Source of immediate energy in microbial metabolism.
35. Inert unit with at least one property of living things.
38. Often contaminates cheese and sour dairy products.
41. Important staining procedure in bacteriology.
42. Protozoal appendages for motion.
43. Virus that replicates in bacteria (abbreviation).
45. Notable bacterium in research and medicine (abbr).
49. The major component of the bacterial cell wall is __ -tidoglycan.
50. Digestive enzymes occur in a lysos- __ of a eukaryotic cell.
51. An anaerobe is the cause of cases of teta- __
53. AIDS virus (abbreviation).
55. Place where *Salmonella* species thrive.
57. Red-pigmented Gram-negative rod (initials)

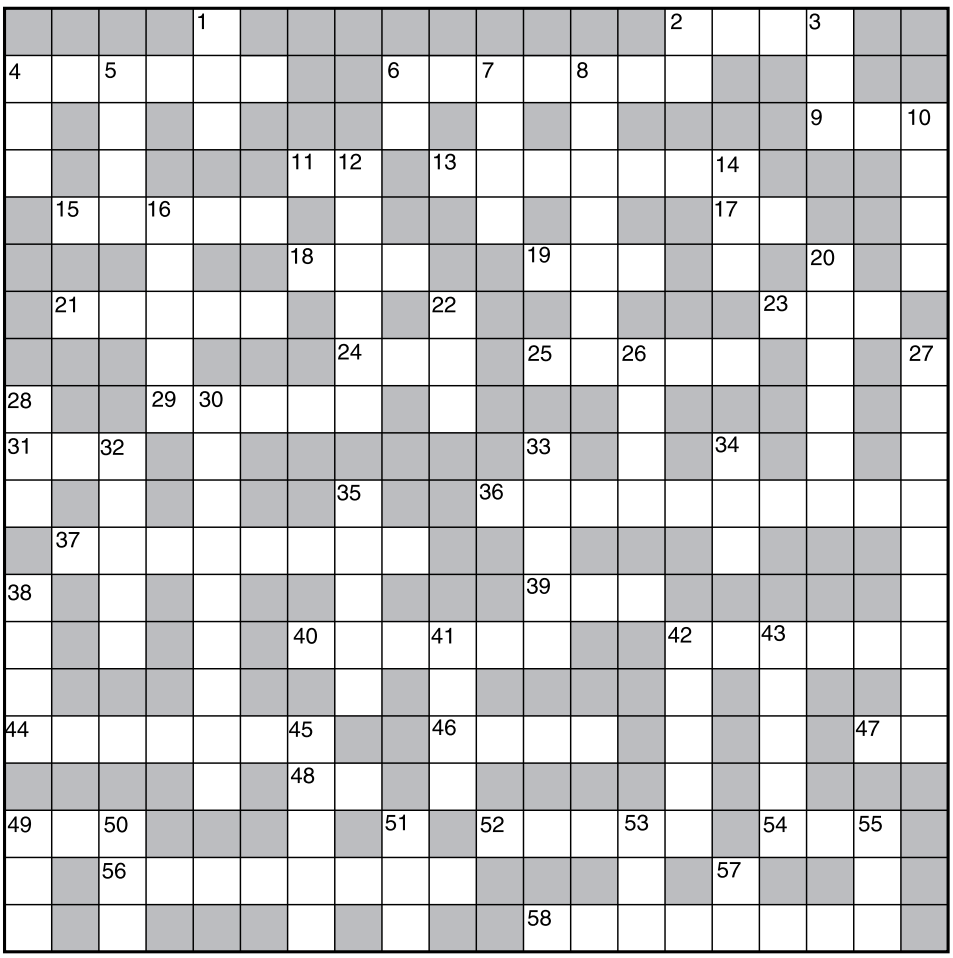
Across

2. Developed the condenser and oil immersion technique.
4. What the plasma membrane resembles.
6. A closed loop of DNA.
9. Type of electron microscopy that requires sections (abbr).
11. Tract (abbreviation) infected by certain bacteria.
13. Found in protozoa but not bacteria.
15. Some are considered microorganisms.
17. Famous coliform bacillus (initials).
18. Genetic material
19. Environment tolerated by sporeformers.
21. First mrd in the binomial name.
23. Phase of microbial growth (abbr).
24. An organism with a single flagellum is __ -otrichous.
25. Prerequisite for life.
29. Formed by fungi for reproductive purposes.
31. Glucose breakdown along a metabolic path __.
36. Tiny bacterium.
37. Type of prokaryote.
39. A cytoplasmic gran- __ may contain starch or phosphate.
40. Occur in mold and yeast forms.
42. Protein coating of virus.
44. Possibly due to microbial growth.
46. Solidifying agent in growth medium.
48. Element (abbreviation) used to maintain low microbial population in water.
49. There are no organelles in __ karyotes
52. Strand of fungal cells.
54. Medium used for cultivating rickettsiae.
56. Visible mass of fungal strands.
58. Basis for classifying protozoa.



Answers to the September Crossword

Another overwhelming response to the editor's micro-break challenge, thank you to all who entered September's crossword competition. Unfortunately there can be only one winner who on this occasion is **Ms C Caddick** from Birmingham who will receive a **£10 book token** for her efforts. Well done to you. A slightly larger crossword for you to attempt this time so the stakes have been raised to a prize of £30 worth of book tokens! All correct entries received by Friday 17th January 2003 will be stuffed into the editor's lab-coat pocket and the winning entry drawn by an independent referee. Answers will appear in the March issue of **'*Microbiologist*'**



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A £30 book token waiting for the person who gets the correct answers to me first! The closing date for entries is **Friday 17 January 2003**. The answers will appear in the next issue of the ***Microbiologist***.

Name: _____

Address: _____

Simply photocopy this page and send it to:
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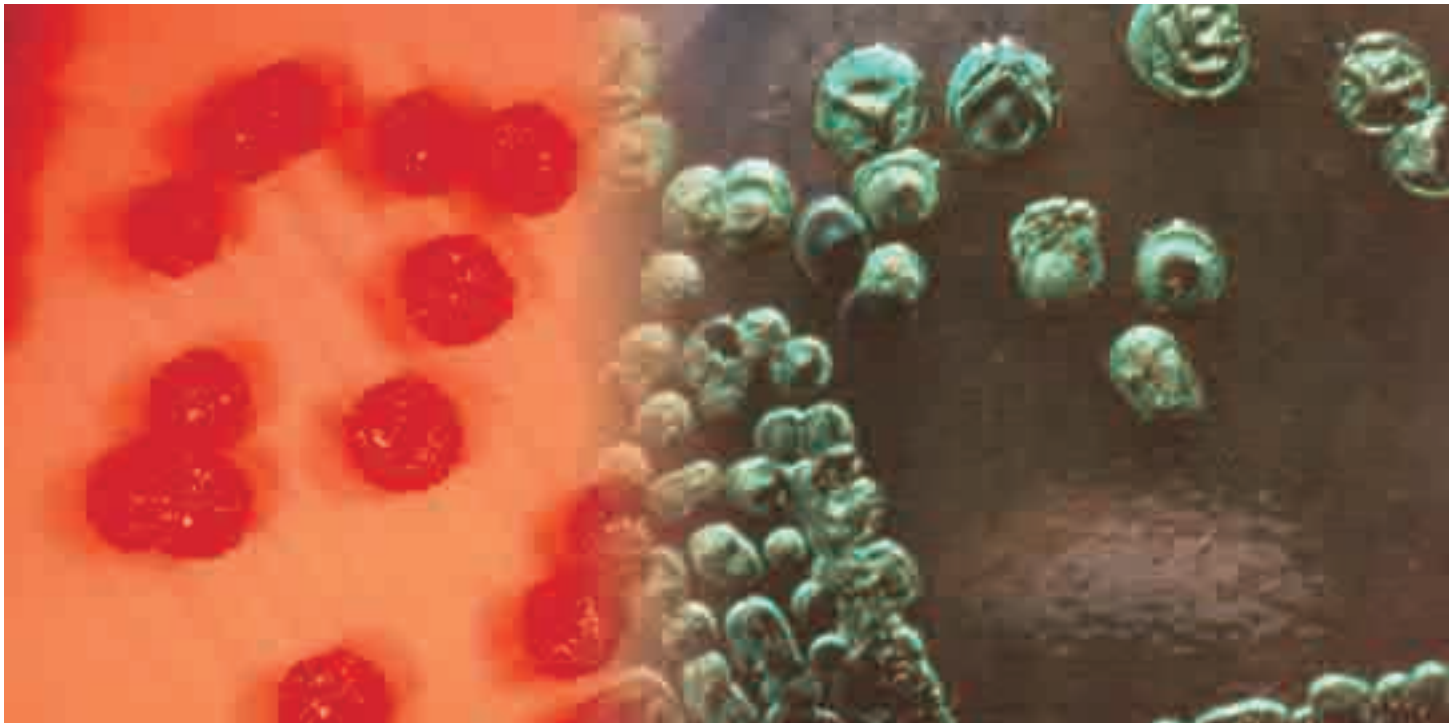


Bacterial Pigments

Maurice Moss explores the colourful world of microorganisms

IF one leaves a plate of nutrient agar exposed to the air for about 30 min, or makes a spread plate of an appropriate dilution of river water, and incubates at 25°C for a few days, a number of coloured colonies of bacteria will usually appear. The yellow and pink colonies from the air exposure plate will usually be Gram-positive micrococci whereas the much wider range of colours from the river water will often be Gram-negative rods such as *Flavobacterium*, *Cytophaga*, *chromobacteria*, *Serratia* and pseudomonads.

The genus *Micrococcus* includes a full range of colours associated with carotenoid pigments from the yellow of *M. luteus* and *M. varians*, through the orange of *M. nishinomiyaensis*, pink of *M. roseus* to red of *M. agilis*. The carotenoids are widespread amongst bacteria and undoubtedly play an important role in protecting them from the damaging effects of light and, in an aerobic environment, the oxidative damage from activated forms of oxygen. There are several hundred different carotenoids known but they all have an extended system of conjugated double bonds such as that of β-carotene (Fig. 1). One or both of the cyclohexene rings at the ends of the chain may be replaced by aromatic rings, or aliphatic chains, and it is the extent of the conjugation, and the presence or absence of oxygen functions, which determines the depth of colour of these molecules.

Carotenoids may also play a role as light-gathering pigments in photosynthetic bacteria but a major group of light-gathering pigments, in the cyanobacteria, is the phycobiliproteins which are red or blue and have a very different structure from the carotenoids. The chromophore coupled to a protein is a chain of four nitrogen containing pyrrole rings, a typical example being phycocyanin (Fig. 2). A detailed and beautifully illustrated introduction to the pigments associated with photosynthetic bacteria can be found in Madigan, Martinko & Parker (2000). There is almost certainly a biosynthetic relationship between these open chain tetrapyrroles and the elegant closed rings of the chlorophylls but pyrrole rings are also present in the red and purple pigments of non-photosynthetic bacteria.

Prodigiosin (Fig. 3) is a tripyrrole first characterised from *Serratia marcescens* which forms beautiful pillar-box red colonies. A wide variety of bacterial taxa, including Gram negative rods such as *S. rubidaea*, *Vibrio gazogenes*, *Alteromonas rubra*, *Rugamonas rubra*, and Gram positive actinomycetes, such as *Streptoverticillium rubrireticuli* and *Streptomyces longisporus* ruber form prodigiosin and/or derivatives of this molecule (see Austin and Moss, 1986 for references). On some media *Rugamonas rubra*

produces so much prodigiosin that, as the pH drops, it precipitates out within the cells and colonies change from pillar box red to deep maroon, often with a green metallic sheen under reflected light (Fig. 4). At this stage most organisms in the colony are no longer viable.

Although, in the early days of bacteriology, the name *Chromobacterium* was used for many organisms producing bright colours whether they were yellow, red or purple, it was soon restricted, not only to those organisms producing purple colonies, but to those in which the purple pigment is violacein (Fig. 5). It is now appreciated that violacein producing bacteria can be assigned to at least three genera - *Chromobacterium*, *Janthinobacterium* and *Iodobacter* (see Moss and Ryall, 1981 and Logan, 1994 for discussions of the early and subsequent characterisation of these genera). Many of these organisms are isolated from soil and water and one possible role of violacein is to make the bacteria

Figure 1. The structure of β-carotene

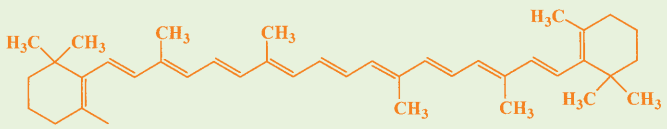


Figure 2. The structure of phycocyanin

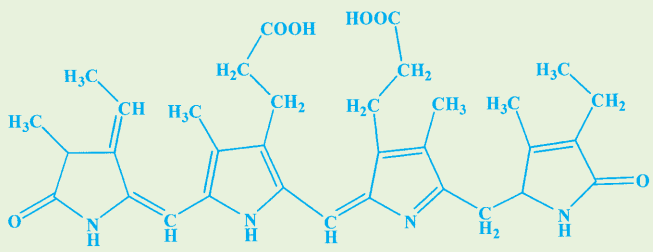
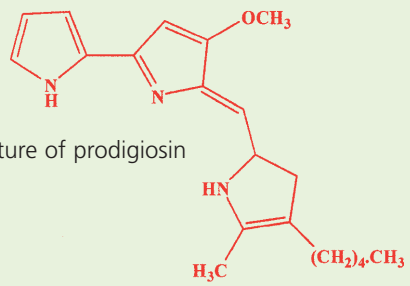


Figure 3. The structure of prodigiosin



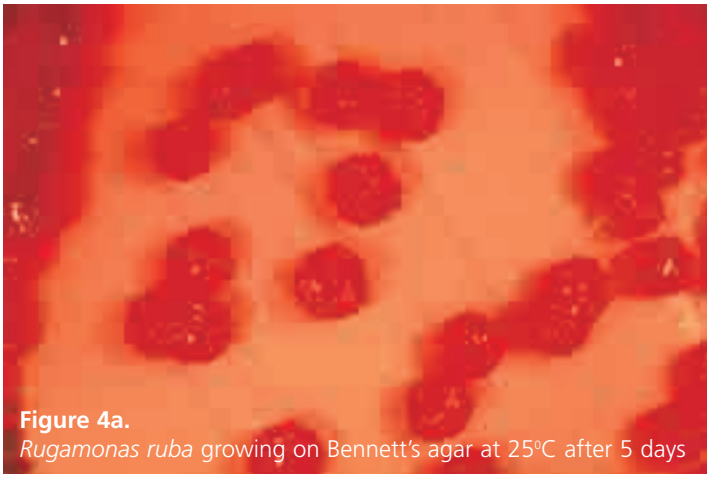


Figure 4a.
Rugamonas ruba growing on Bennett's agar at 25°C after 5 days

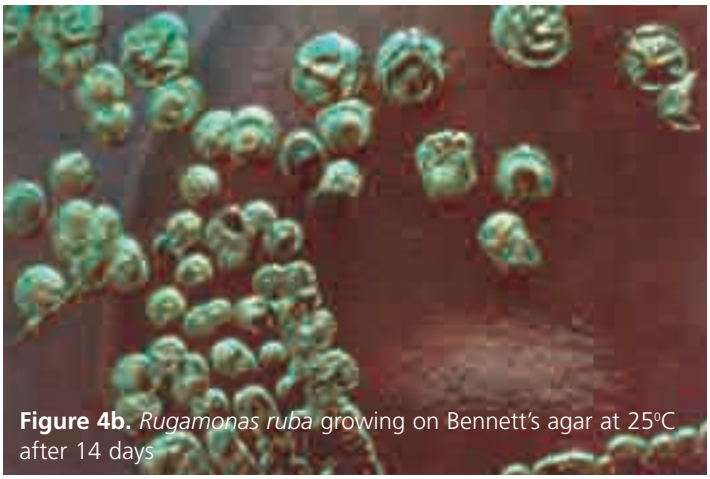
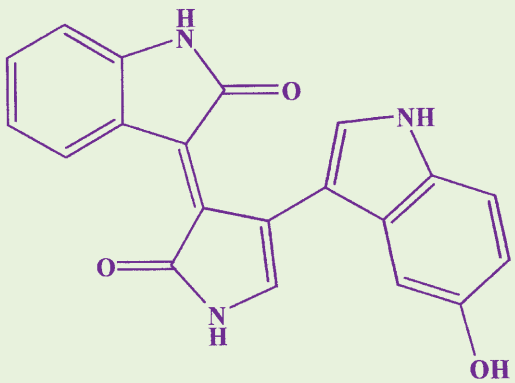


Figure 4b. *Rugamonas ruba* growing on Bennett's agar at 25°C after 14 days

Figure 5. The structure of violacein



unpalatable to bacteriophagous species of protozoa and nematodes.

Perhaps the most familiar examples of coloured colonies seen in the routine soil, water and medical laboratory are those of pseudomonads such as the blue-green colonies of *Pseudomonas aeruginosa* or the yellow fluorescent colonies of *Ps. fluorescens* and related species. An example of a water soluble, non-fluorescent blue-green pigment produced by *Ps. aeruginosa* is pyocyanin (Fig. 6) which crystallises as beautiful blue needles and may have a role in respiration. The yellow water soluble fluorescent pigments produced by a number of Pseudomonas species, especially under conditions of iron limitation, are variously known as pyoverdin, pyofluorescein or simply fluorescein.

There is some confusion in my own mind over the naming of these compounds but it may be that one of the compounds actually secreted by pseudomonads is fluorescin which is subsequently oxidised to the yellow fluorescent fluorescein (Fig. 7).

The pyoverdines are a large family of complex siderophores in which a dihydroxyquinoline derivative is linked to a peptide which itself may be linked to a cyclic depsipeptide. They are able to bind metal ions, especially iron, and for those who would like to follow up the structure of these beautifully complex molecules I can commend starting with Poppe et al. (1987). But there are other pigments too, pyorubins, pyomelanins and the pseudomonads have provided a considerable challenge to students of natural products.

Figure 7. The oxidation of fluorescin to fluorescein

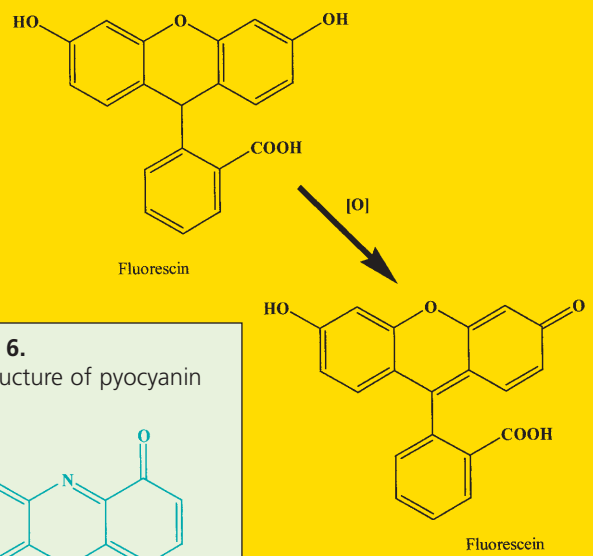
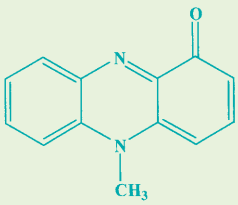


Figure 6.
The structure of pyocyanin



Maurice O. Moss
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Guildford, Surrey, GU2 7XH UK

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Bugs in Space

A device to detect extra-terrestrial bacteria is being developed by NASA researchers to hunt out deadly mutated strains that are unknown on Earth. It will be used at first to safeguard the health of orbiting astronauts. Eventually, it could also be used on Earth to diagnose infections or to detect biological hazards. The research is being carried out by the National Space Biomedical Research Institute, a NASA-funded consortium studying health risks in space.

"We are not specifically looking for deadly mutated bacteria," said George Fox, professor of biology and biochemistry at the University of Houston, Texas.

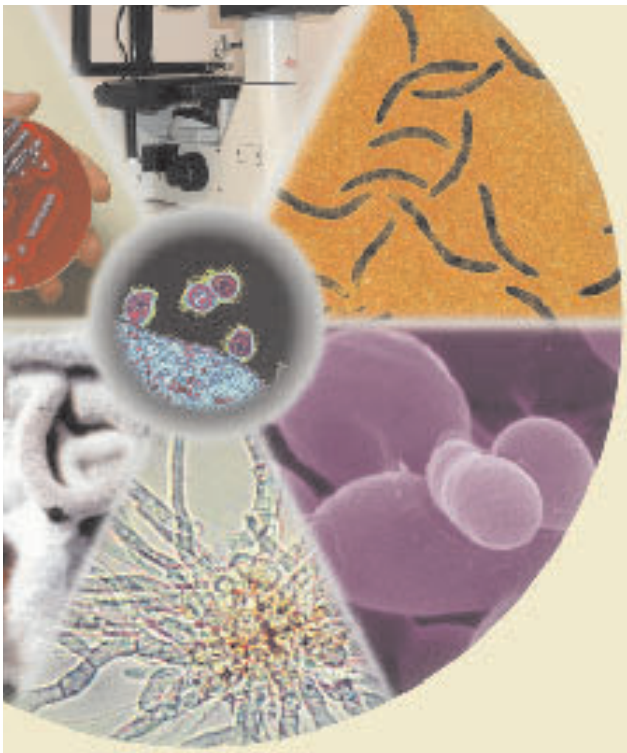
"We are more concerned about preventing everyday infections because, if you get sick in space, you don't have a hospital around the corner for treatment. Our goal is to avoid infections with routine monitoring to keep bacteria levels low in the first place."

Space stations are an ideal breeding ground for bacteria. Furthermore, weightlessness and higher radiation levels may increase the mutation rate of bacteria.

"Because of space's unidentified effects on bacteria and the immune system, we don't know which organisms will cause problems," Dr Fox added. "However, we have developed a technique to determine an organism's approximate identity."

The device uses knowledge of the genetics of bacteria to pinpoint DNA sequences that are common to certain groups.

In theory, it should be able to detect extra-terrestrial bacteria that are similar to those found on Earth.



1st FEMS CONGRESS OF EUROPEAN MICROBIOLOGISTS

SLOVENIA

LJUBLJANA, CANKARJEV DOM

June 29 - July 3, 2003

www.fems-microbiology.org/congress2003.htm

PLENARY LECTURES

- Microbial Diversity
- Food safety
- Emerging Pathogens,
- Environmental Microbiology

MORNING PROGRAMM WITH SYMPOSIA:

- Development of new antibiotics against resistant bacteria
- Emerging pathogens
- Environmental microbiology
- Food biotechnology
- Food safety
- Functional genomics
- Metabolic engineering of microbes
- Microbial diversity
- Microbial interactions
- Microbial physiology and biochemistry
- Modern diagnostic methods
- Prokarytic evolution and systematics
- Stress in microbes

AFTERNOON PROGRAMME

The afternoon programme will consist of sessions with topics emerging from submitted abstracts (deadline 2002 December 31). Those themes may include: Brucellosis, Mycorrhiza, Bioremediation, Biofilms, Fish microbiology, Metabolism, Mycoplasmas, Plant microbiology, Microbial symbiosis, Antibiotic resistance, Degradation of xenobiotics, Fungi in medicine, etc.

BACILLUS SATELLITE SYMPOSIUM

ROUND TABLES (Bio-terrorism, Bio-informatics, Culture collections, etc)

WORKSHOPS

EXHIBITION

For further information about programme visit or contact:

Email: FEMS2003@cd-cc.si

Website: www.fems-microbiology.org/congress2003.htm

The Lost Art of Bacteriology

Martin Adams and Pattie Hendry reveal the artistic side of Science

MUCH is often made of a supposed antithesis between the Arts and Sciences. While this may be true when perceived from the viewpoint of the arts, where many with a strong artistic sensibility seem to rejoice in their complete ignorance of science, it is certainly not the case with scientists. Many have shown considerable artistic abilities in addition to their scientific achievements. The composer Borodin was a professor of chemistry, Einstein was an accomplished violinist, and Sir Humphrey Davy an enthusiastic poet, indeed one of the present authors had a week's recorder lessons while at Junior school.

In microbiology, Alexander Fleming has achieved immortality through his discovery of penicillin but his artistic side is perhaps less well known. He was a lifelong member of the Chelsea Arts Club, a private club for artists of all genres, founded in 1891 at the suggestion of the painter Whistler. In fact Fleming joined the Club principally for the congenial company it offered and the opportunity to play snooker there. To become a member however he had to demonstrate professional engagement in the visual arts and to this end was forced to paint a picture for exhibition and sale. This he duly did, although there is some dispute over the subject of his painting. Macfarlane in his biography cites one source describing a 'view of the Children's Ward at St Mary's' while another asserts it was a picture of a cow (Macfarlane 1985). It may be that his talents were such that both interpretations of the painting were equally plausible, but in any event it served its purpose.

Fleming's artistic reputation however lies less in any remarkable artistic (in)ability he possessed rather than in his innovative approach to painting. As far as we can determine, he was the first to use pigmented bacteria as an alternative to more conventional media such as water colours or oils. Some of the beautiful pigments produced by bacteria are described in the preceding article by **Maurice Moss** (page 10). They serve a

variety of purposes in the producing organism such as photoprotection and quorum sensing, but their potential as an artistic medium has been little explored. Even in Fleming's time this technique failed to receive much attention or approval. Apparently he prepared a small exhibit of bacterial art for a royal visit to St Mary's by Queen Mary. The Queen was "not amused and hurried past it" even though it included a patriotic rendition of the Union Jack in bacteria (Maurois, 1959). For those interested in seeing examples of Fleming's efforts some are reproduced on the endpapers of the Maurois biography.

At the University of Surrey we have recently revisited this technique, though viewing the results some may feel it wasn't worth the trip. The various productions of the 'Surrey School' have thus far restricted themselves to a *naïve* or *primitif* approach using simply a loop and a limited palette (see below) on nutrient agar. The exciting possibilities of coloured media and chromogenic substrates not available to Fleming are yet to be explored. To some extent bacterial painting can be used as a teaching tool to enliven practical classes as the successful practitioner needs to develop a light but accurate touch to ensure strength of line is achieved without ploughing great troughs in the agar. It may also illustrate aspects of microbial ecology such as antagonism. Though Macfarlane suggests that the technique we have used is essentially the same as Fleming's, Maurois describes a more refined approach that we have yet to try: 'On a sheet of blotting paper he drew his motif - a dancer, a mandarin, a Grenadier Guardsman or a flag. Then he laid the blotting paper on the agar so that it might become nutritive, after which he coloured his design with broths of the appropriate cultures. All that remained was to put the blotting paper into the incubator. As soon as the microbes developed, the picture showed up in colour.'

Some of the results of this technique were apparently demonstrated by Fleming at the Second Congress of Microbiology in 1936. As the illustrations show, our early efforts suggest considerable personal talent and some scope for further improvement. The attractions of pointillism in bacterial painting are immediately apparent. We are therefore pursuing our artistic development with some vigour since we feel it is but a short journey from Guildford to the Tate Modern and untold wealth and fame! ❑

Martin Adams and **Pattie Hendry**,
University of Surrey

A Simple Palette

***Serratia marcescens* - red ■**

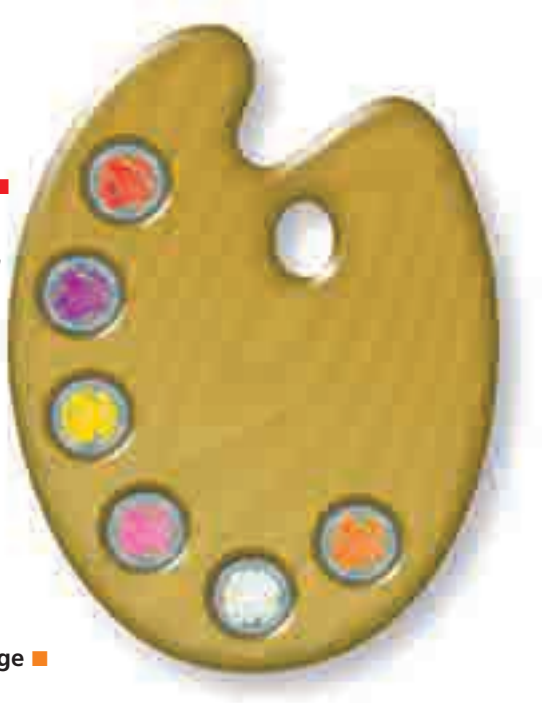
***Chromobacterium violaceum* - purple ■**

***Micrococcus luteus* - yellow ■**

***Micrococcus roseus* - pink ■**

***Micrococcus varians* - white ❑**

***Bacillus sp.* - orange ■**



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Think you can do better? Then send us pictures of your microbial-art masterpieces and we'll enter them into the SfAM gallery. When we have sufficient artwork for an exhibition we can have our own SfAM version of the Turner Prize!

Pharmageddon

The **Institute of Biology**, together with the **Royal Pharmaceutical Society** and with the involvement of several Affiliated Societies including **SfAM**, took its campaign to raise the profile of growing anti-infective resistance to Westminster. A Parliamentary and scientific reception was held at the House of Lords on 17th October attended by **SfAM** President, **Peter Silley**. Duringthe reception parliamentarians were provided with an overview of this pressing issue and a number of explicit recommendations made to address specific concerns.

Resistance to antibiotics, antifungals and antivirals is increasing. There are now emerging some strains of bacteria resistant to all antibiotics. With no new class of antibiotics in the development pipeline, and over ten years' lead time if there were, what are we to do? Experts from independent and charitable learned and professional bodies have come together with those from a Government Department and research agency as well as industry to identify a way forward.

Right now

- There are 5,000 deaths per annum in the UK from infectious diseases contracted in hospitals
- There has been no completely new class of antibiotic developed in the last 30 years
- Virtually all major pharmaceutical antibiotic research has moved out of the UK
- New antibiotics take in excess of 12 years to bring to market at an approximate cost of £250 million
- Any new antibiotics would be promoted for use by companies seeking to recover development costs' which is counter to the desire to limit their use to treat resistant organisms
- In many countries antibiotic availability and use is so indiscriminate that resistance is a serious burden worldwide

These are the facts in 2002

- Parliamentarians understand how important these issues are, and in 1998 the House of Lords published a report on antibiotic resistance
- Antibiotic use as prophylactics in agriculture is declining, with application as growth promoters negligible in the UK
- We have the necessary scientific and medical expertise to prevent the future scenario envisaged

The bad news

- In 1969 the Swann Committee recommended that Government address resistance, but the Expert Advisory Committee on Antimicrobal Resistance recommended by Swann was only set up in 2001. Little progress has been made implementing recommendations of the House of Lords Report issued in 1998 Continuation of the national surveillance system currently provided by the PHLS is in doubt

Future - fact or fiction?

If the situation remains unaltered then within the next couple of decades:

- There will be more strains of bacteria resistant to all our antibiotics in our communities and within many hospitals in the UK
  There will be strains of bacteria resistant to some antibiotics in all hospitals in the UK
- Reliable surveillance data on the various antibiotic-resistant strains of bacteria in either our hospitals or local communities will not be available
- Numbers of intensive care patients will rise (costing £1000 - £1800 per patient per day) resulting in a commensurate increase in NHS costs
- A marked increase in the number of deaths per annum from infectious diseases will occur in the UK

Now!

Anti-infectives: the way forward

- It is unlikely that effective new antibiotics will be available to tackle the problem
- There will be few medical microbiology specialists being trained at degree level, and new doctors will have only a rudimentary grasp of infectious disease
- The UK will have returned to the pre-antibiotic era and average life expectancy will significantly decrease

Action Required

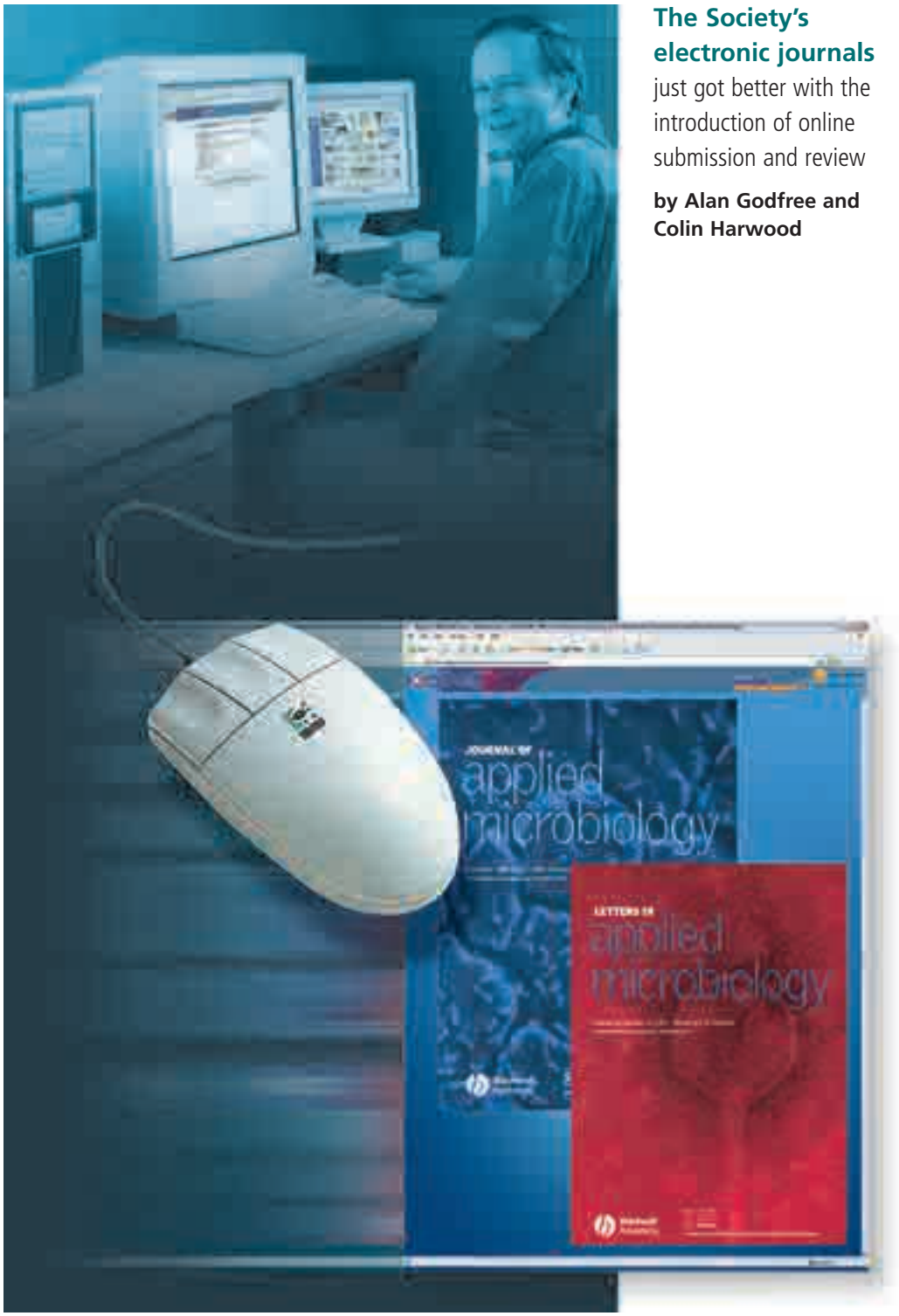
To prevent this future scenario decisive action is urgently required.

The UK must

- ENSURE that the recently published UK Antimicrobal Resistance Strategy and Action Plan is actively adopted by all stakeholder departments and agencies. The Interdepartmental Steering Group, and recently established Expert Advisory Committee on Antimoicrobal Resistance, must continue to press for widespread acceptance of the strategy
- DEVELOP a cross-departmental co-ordinated funding programme, involving charities and industry as appropriate, to stimulate efforts in antibiotic research, to facilitate effective long-term surveillance of antibiotic resistance, and to tackle the growth of hospital-acquired infections
- INCREASE funding for academic research focused on development of new therapeutics
- PROVIDE a more favourable climate for pharmaceutical companies to develop new antibiotics by extending market exclusivity for these beyond the current 20 years from patent registration, through changes to patent legislation, to provide patent rights running 20 years from marketing
- ENSURE that foreign policy champions best practice for antibiotic use overseas, particularly in Europe, with new products being given EU-wide licenses
- PROVIDE Literature and advice at school level to encourage pupils to pursue careers in pharmaceutical science and medical microbiology and related professions. Government Departments should liaise with learned societies to this end
- REVISE medical and veterinary curricula to reflect the significance of infectious disease and the appropriate use of antibiotics.

- **5,000 people die every year in the UK from infectious diseases contracted in hospitals**
- **There will be more strains of bacteria resistant to all our antibiotics in the UK**
- **No completely new class of antibiotic has been developed in the last 30 years**

Electronic Jam



The Society's electronic journals just got better with the introduction of online submission and review

by Alan Godfree and Colin Harwood

DEVELOPMENT of the Society's journals continues apace with the introduction of online submission and review. This is a major step forward for Letters in Applied Microbiology and the Journal of Applied Microbiology and one that will bring significant benefits for everyone involved with the journals.

> Currently Blackwell's staff are processing over 800 manuscripts a year

Editorial Office

During the tenure of Duncan Stewart-Tull as Chief Editor, both journals were administered by a small team working with Duncan and based at the University of Glasgow. Following a decision to transfer day-to-day administration of handling manuscripts to our publishers Blackwell Publishing, the editorial office was transferred to their London office during the latter part of 2000. Currently Blackwell's staff are processing over 800 manuscripts a year, a number that is increasing steadily.

A well-run editorial office is a key factor in the success of any journal, and it is clear that new technologies have the potential to improve the efficiency with which manuscripts are handled and reviewed.

The adoption of electronic software for managing the editorial processes has been the norm for some time while the adoption of online systems for peer review is becoming increasing widespread among scientific journals. The Editors have agreed that the time is now right to set up an Electronic Editorial Office for the Society's two journals.

Electronic manuscript management and peer review

The advantages of running an Electronic Editorial Office for the Society's journals include:

- Faster peer review.
- The facility for authors to track the progress of their manuscript.
- Increased efficiency.
- Better coordination across the editorial team.

The decision to implement a system of electronic manuscript handling and review was taken at Committee in July 2001. Since then we have worked closely with our publishers to develop a system tailored to the needs of the Society. Blackwell Publishing has adopted ScholarOne's **Manuscript Central**™ for more than 30 journals and this was a natural choice for ***Letters in Applied Microbiology*** and the ***Journal of Applied Microbiology***.

One key advantage of **Manuscript Central**™ is that it is hosted on the Web; i.e. it is fully accessible online. It is a comprehensive system for manuscript management from submission by the author, through peer review, up to the final decision stage. The system requires authors, editors and referees to check in at the journal's dedicated Web site and, as appropriate, to upload manuscripts, assign manuscripts to editors, assign referees, submit referee's reports and so on. Within this system, data builds and correspondence is generated as information is input, eliminating much of the clerical and data-entry work normally carried out in the Editorial Office. Manuscript files are always available online and may be downloaded as required, eliminating any need to provide files as email attachments.

Manuscript Central™

Within **Manuscript Central**™, functions are divided into five "centres" which are accessible to authors, referees, editors, chief editor and editorial office staff as appropriate. User access is based on a username and password system, and all users are able to set up their own accounts via the Web interface.

Administration is minimal; the Editorial Office simply sets the appropriate access privileges for each user. Submissions remain confidential until peer review is completed, with manuscripts made available to the selected referees only until a final decision is made.

The corresponding author may upload all tables and figures embedded within the manuscript text file saved in Microsoft® Word (.doc) or Rich Text Format (.rtf). During file upload **Manuscript Central**™ automatically generates a Portable Document Format file (.pdf) for online review. The native file format (.doc or .rtf) is also preserved and remains accessible for the editorial office staff. If for any reason the submission process is interrupted the system will save all information and, where applicable, uploaded files. Authors can log into their Corresponding Author Centre on a later occasion and continue with the completion of their partially submitted manuscript. Upon successful submission an email confirmation containing the manuscript reference number is immediately sent to the corresponding author. If the corresponding author provides email addresses for each contributing author during submission, a confirmation of submission email will also be sent to each author immediately upon submission. Where the person submitting is not the corresponding

Screen shot 1: Entry into the site is by Username (User ID) and Password only. First time users must create their own account using the top left button

Screen shot 2: Entering manuscript details during online submission

author, they should submit the manuscript by logging in to the corresponding author's centre (they can create their account if one does not exist).

The Editors strongly encourage submission of a single manuscript file containing all tables and figures. However, for some authors it may be easier to submit their manuscript and figure files separately. Acceptable figure file formats include TIFF (.tif), JPEG (.jpg), GIF (.gif) and EPS (.eps). Authors wishing to submit multiple files are advised to contact the Editorial Office before proceeding. A useful feature of the Author Centre is the provision of a summary status of where a manuscript is within the peer review process; the level of information that the corresponding author is permitted to see is decided by the Chief Editors, and set by ScholarOne. Providing access to this information is a useful service to authors that should cut down telephone or email queries to the Editorial Office or Chief Editors.

> The Editors strongly encourage submission of a single manuscript file containing all tables and figures

> ..once the benefits will become clear to authors they will embrace online submission.

Adoption of online submission

Authors are being encouraged to submit their manuscripts online. The next few months will see a number of measures to maximise uptake of the new system, including publicity material, targeted mailshots to previously published authors, and the Web site.

The Editorial Office, now based in Oxford, will continue to accept and process papers submitted as hard copy. However, we expect that once the benefits become clear to authors they will embrace online submission, not least because of the reduced amount of time that it takes to have their paper published in the ***Journal of Applied Microbiology*** and ***Letters in Applied Microbiology***.

Alan Godfree and Colin Harwood
Honorary Chief Editors

References

***Online submission via Manuscript Central™**
■ http://appliedmicrobiology.manuscriptcentral.com/index.html

Online Society Journals via Synergy
■ http://blackwell-synergy.com/servlet/useragent?func=showHome

Sfam Website
■ http://www.sfam.org.uk/index.html

***Please note that as we went to press this service was ONLY available for testing purposes**

Screen shot 3: Entering comments to Chief Editor

Screen shot 4: Uploading files associated with a new submission

Screen shot 5: Successful submission is confirmed on screen with a manuscript reference number and date of submission. The corresponding author also receives this information by email

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 at www.sfam.org.uk

picture by kind courtesy of Unilever Research

Screening for new antimicrobials against MRSA

AFTER four years of studying for a BSc (Honours) Microbiology at Aberdeen University, I graduated in July. Still unsure of my choice of career, the Society for Applied Microbiology students into work scheme enabled me to gain a great insight into life in a research laboratory.

Last summer I completed a work placement in a hospital laboratory and this year I decided to apply for a work placement in scientific research. I was therefore delighted when I was offered a ten-week placement with the National Collection of Industrial and Marine Bacteria (NCIMB). Whilst at University, I particularly enjoyed the modules which focused on Medical Microbiology and therefore, the topic of my project, methicillin resistant *Staphylococcus aureus* (MRSA), was of particular interest to me.

Staphylococcus aureus is a Gram-positive coccus, commonly found on the skin of healthy people. If *S. aureus* invades the body, it can cause infections. One antibiotic used to treat such infections is methicillin. However, due to the overuse of methicillin, some strains of *S. aureus* have acquired a resistance to this and other antibiotics. These bacteria are known as MRSA. MRSA usually infects seriously ill patients and the elderly and is therefore a growing problem in hospitals and nursing homes. It is difficult to treat due to its resistance to most antibiotics, giving rise to a need for research into new therapies.

The National Collection of Industrial and Marine Bacteria Ltd has a collection of hundreds of different strains of freeze-dried bacteria. The aim of this project was to screen a selection of the culture collection strains for activity against MRSA. The culture collection bacteria may be a reservoir of potential for undiscovered antimicrobials. Also, sixty-five strains of newly isolated, tropical streptomycetes, were also screened for activity against MRSA.

A range of culture collection organisms were opened and the bacteria were resuscitated. Once the bacteria had grown, the test strains were grown on solid media under optimal conditions to allow any extracellular bioactive compounds to be produced. The plates were then over-seeded with MRSA and incubated overnight. The zones of inhibition, resulting from any inhibitory compounds produced by the test strains, were recorded and several strains were selected for further analysis with six more clinical isolates of MRSA and one strain of Vancomyocin Resistant Enterococcus (VRE).

Another part of the project with NCIMB was to investigate the reported benefits of some plant extracts against MRSA. Some aromatic oils have antiseptic and antibacterial properties and because of this, have been widely used since ancient civilisation. Such antiseptic properties may play a key role in the treatment and prevention of serious infections such as MRSA. Experiments were therefore designed to screen ten aromatic oils for activity against MRSA.


Helen Jolly

The outcome of the study was very encouraging, in that many of the culture collection strains gave good zones of inhibition against all seven strains of MRSA and VRE. Also, a number of the aromatic oils inhibited the growth of MRSA. These strains and oils would therefore merit future research, into their inhibitory properties, and in particular the identities and structures of the active compounds involved.

I would like to thank my supervisor Dr Peter Green, Sue Lindsay and all the other staff at NCIMB for their friendliness and help during my ten weeks. I am also grateful to the *Sf*AM for the opportunity of completing a work placement in scientific research. Over the past ten weeks I have gained an invaluable insight into the working of a scientific research laboratory and found the placement both interesting and challenging. I enjoyed all aspects of laboratory research, but in particular, I enjoyed the successful planning and execution of experiments. I have gained experience in working with containment level 2+ organisms and have had the opportunity to improve my aseptic techniques, media preparation and culture purity checking and preservation. Most importantly, I have learnt the necessity for planning ahead and working as a team, in order to achieve a smoothly run laboratory.

Helen Jolly

Isolating And Identifying Microorganisms From Microbial Mats

CONCERNS over the ecological consequences associated with oil spills have grown in recent years. Public concern is high and there is a real need to develop alternative bioremediation methods which can remove oil safely from the oceans with as little damage as possible to the environment. Interest in hydrocarbon degradation by microbial mats had increased following the deliberate release of crude oil at the end of the Gulf War. The ecological disaster anticipated did not occur and is thought to have been prevented by the microbial mat communities present in the intertidal zone of the Arabian Gulf. Microbial mats develop at the sediment-water interface and are found throughout the world from the tropics to Antarctica. They consist of stratified layers containing cyanobacteria, purple sulphur bacteria and sulphate reducing bacteria. These microbial communities develop along steep physico-chemical gradients and co-exist for many years by providing each member of the community with the appropriate nutrients for growth.

My project was concerned with isolating and identifying microorganisms from these mats, concentrating on mats from the Etang de Berre which is an oil polluted lagoon close to the Mediterranean port of Marseilles. Using traditional methods such as Gram staining, catalase and oxidase tests, carbon source utilisation and cell morphology it was possible to identify species of bacteria found in the mat. Gas chromatography and NMR spectroscopy were also used to study the breakdown products produced by the organisms.

The majority of isolates obtained were *Marinobacter spp*, a Gram-negative, aerobic motile rod shaped bacterium which was previously classified as a member of the Pseudomonadaceae. This was the most common microorganism found within the mats. However, species of *Halomonas* and *Alteromonas* were also found. Using different hydrocarbons as the primary carbon source it was possible to isolate benzene and toluene degraders, including a *Bacillus spp*.

Before the *Sf*AM Students into Work Placement I had never been given the opportunity to work in a research laboratory and all my previous experience of lab work was gained from my undergraduate practical classes. The six weeks I spent in Professor Herbert's laboratory allowed me to be in control of my own project and taught me a wide range of new skills and techniques. I now enter the fourth year of my course looking forward to the challenge of my honours project and with a new found confidence. When I graduate I hope to continue my studies to PhD level.

I would strongly recommend a SfAM Students into Work Placement to anyone interested in Microbiology and to anyone who is considering postgraduate studies. The time spent working in the lab was a great benefit to me and proved to be a thoroughly enjoyable yet challenging experience.

I would like to express my thanks to the Society for giving me this opportunity to carry out research.

Jennifer Kennedy
University of Dundee

society for applied sfam microbiology

January Meeting

Holiday Inn, Birmingham, UK ● 8 - 9 January 2003

Lab on a chip: diagnosis and onsite testing

The electronic chip has opened up the possibility of comprehensive, simultaneous analysis for the presence of multiple pathogens

Clinical applications

- Developments in hand-held sensor devices
- Diagnosis of infection, molecular signatures, point-of-care systems, osmosensing
- Antibiotic sensitivity testing with microarrays
- Near-patient testing, safety and quality control

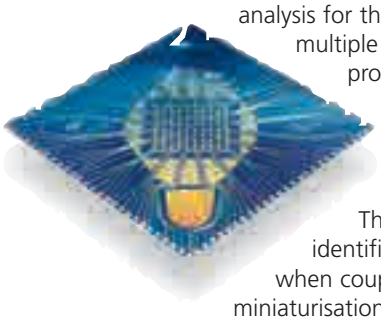
Environmental and food safety aspects

- Monitoring environmental pollutants
- Bioassays for mycotoxin detection
- Detection of microorganisms in the environment
- Airborne pathogen and biohazard detection

hIS Meeting
been awarded
accreditation to
e value of 1.6
CREDITS

IN the field of microbial diagnosis there is a continuing demand for techniques that provide an answer in the quickest possible time. Molecular tests or immunoassays are rapid by comparison with conventional culture and phenotypic test procedures, but are generally designed for the identification of individual pathogens.

The electronic chip, designed in the form of a biosensor, has opened up the possibility of comprehensive, simultaneous analysis for the presence of multiple pathogens or their products or for parallel testing for the presence of specific drug-resistance alleles. This multiplex identification system, when coupled to the miniaturisation of the chip components, has facilitated the development of portable hand-held devices for pathogen diagnosis in the clinical or environmental setting.



Chip and molecular technology come together in the form of micro-arrays. Many thousands of spots of nucleic acids or proteins can be deposited onto a solid surface, the 'chip', no larger than a microscope slide. In the case of DNA arrays, chemical bonding between the reference probe on the solid surface and complementary sequences in the target in the sample solution provides information about the nucleic acid sequences present in the sample. For proteins, the analogous reactions are between antigens and antibodies and these form the basis of protein arrays, although there are considerable technical challenges to overcome before protein arrays can reach the level of development seen with DNA microarrays

Miniaturisation is achievable where the system responds electronically to binding of test material to an array spot usually via fluorescence emission from DND/DNA hybrids or antigen/antibody complexes. Image analysis software correlates the position of the fluorescence with the identity of the reference probe. Automation of these complex processes is the goal where no user intervention is required after samples are loaded and results are obtained in a matter of minutes.

Array sensors have important applications in routine monitoring of environmental and clinical samples whereby a sample can be rapidly screened simultaneously for the presence of any number of pathogens or their products giving an inventory of the microbial community and the identity of mixed infections. Bedside detection or onsite use in the field of a hand-held 'chip' device would be the ultimate goal and preliminary systems have been developed.

The meeting will address both current uses and technological developments in several areas of biosensor detection. It will include contributions from companies and researchers active in these fields with 'portability' as a major theme, but speed and ease of detection, safety, quality control, cost effectiveness and the need to fulfill the requirements of the end-user are all seen as important issues.

John Coote, Convenor, Molecular Biology Interest Group.

BOOKING FORM and INVOICE

January Meeting 8 - 9 JANUARY 2003

'LAB ON A CHIP - DIAGNOSIS AND ONSITE TESTING'

Venue: Holiday Inn, Birmingham City Centre, UK

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

Registration Fee and Package arrangement costs:

1. **For Members:** One night's accommodation (8th January) to include full breakfast, coffee/tea, lunches, 3 course Conference Dinner plus whole conference registration fee: £215.00
2. **Non-Members:** (to include package as above) £315.00
3. **Members Day Delegate rate:** includes coffee/tea and lunch: £75.00
4. **Non Members Day Delegate rate as above:** £150.00
5. **Student / Honorary and Retired Members rate for full package as 1 above:** £110.00
6. **Student/Honorary and Retired Members Day Rate:** £60.00

Please complete and return this form by post or fax to: The Society For Applied Microbiology, The Blore Tower, The Harpur Centre, Bedford, MK40 1TQ, UK.
PLEASE NOTE: only 1 person per from please. If additional forms are required, please photocopy this one.

Closing date for registration is Monday 16 December 2002.

PARTICIPANT

Title:_____ Family Name:_____ First Name:_____

Address:_____

_____

_____

Post Code:_____ Fax No:_____ Tel No:_____

Email:_____

I wish to share my room with participant: _____

(PLEASE NOTE: a separate booking form is required for each participant)

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 cards are acceptable: VISA, Mastercard and Eurocard.*

☐ Cheque enclosed ☐ Please charge my credit card *(please tick applicable boxes)*

Amount enclosed/ to be debited: _____

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

Signature:_____ date:_____

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

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Programme

Wednesday 8 January 2003

10.00 - 11.00 Registration - Coffee/Tea

Introduction

11.00 - 11.40 Microsystems technology in bioanalytical sensing
Jon Cooper, Dept. of Electronics, Glasgow University, Glasgow, UK

Technological developments and clinical applications

11.40 - 12.20 Molecular signatures' for diagnosis of infection
Peter Ghazal, Scottish Centre for Genome Technology and Informatics, University of Edinburgh, Summerhall, Edinburgh, EH9 1QH, UK

12.20-13.00 Applications of the Nanochip in microbial analysis.
Richard Watts, Nanogen UK, Cambridge, UK

13.00 - 14.15 Lunch - Poster Viewing (Authors present 13.45 - 14.15pm)

14.15 - 14.55 New technology and laboratory diagnosis
Peter Borriello, Central Public Health Laboratory, Colindale, London, UK

14.55 - 15.35 Species differentiation and antibiotic susceptibility testing with microarrays
Guy Vernet, BioMerieux Europe, UK

15.35 - 16.15 Pathogen detection through osmosensing microarray technology
Frank Swenson, Osmetech plc, Crewe, UK

16.15 - 16.35 Tea/Coffee

16.35 - 16.50 Offered paper (15 min)

16.50 - 17.30 Antigen microarrays for serodiagnosis of infectious diseases
Andrea Ardizzoni, Biology Department, Imperial College of Science, Technology and Medicine, London, UK

17.30 - 18.10 Near-patient testing - safety issues and quality control
Peter Mackie, Virology Department, Sick Children's Hospital, Glasgow, UK

19.00 Trade Show Reception

20.00 Conference Dinner

Thursday 9th January, 2003

Environmental and Food safety Aspects

08.30 - 09.10 BioMicroElectronic sensors for monitoring environmental pollutants *in situ.*
Gary Saylor, Center for Environmental Biotechnologies, University of Tennessee, Knoxville, U.S.A

09.10 - 9.50 Identification of genes and GMOs in the environment.
Mark Bailey, Virology and Environmental Microbiology Department, Centre for Ecology and Hydrology, Oxford, UK

09.50 - 10.30 Recombinant antibodies - immuno-molecules tailor-made for biochip applications?
Andy Porter, Molecular and Cell Biology Department, Institute of Medical Sciences, Aberdeen University/Haptogen plc, UK

10.30 - 10.50 Coffee/Tea

10.50 - 11.30 DNA-based microarrays and immunoassays for laboratory and on-site testing in food and agriculture
Ian Barker, Neil Boonham, Chris Danks and John Banks, Central Science Laboratory, York, UK

11.30 - 12.10 Detection of microorganisms in water by electrorotation chip technology
Andy Goater, Molecular and Biomolecular Electronics Institute, University of Wales, Bangor, UK

12.10 - 12.40 Offered papers II, III (15 minutes each)

12.40 - 14.15 Lunch - Poster Viewing (Authors present 13.45 - 14.15pm)

14.15 - 14.55 Array biosensors for detection of biohazards
Kim Sapsford, Biomolecular Science and Engineering Center, Naval Research Laboratory, Washington DC, U.S.A.)

14.55 - 15.35 Rapid pathogen detection systems
Martin Pearce, Detection Dept., DSTL, Porton Down, Salisbury, Wilts, UK

15.35 Coffee/Tea Departure

BOOK NOW!

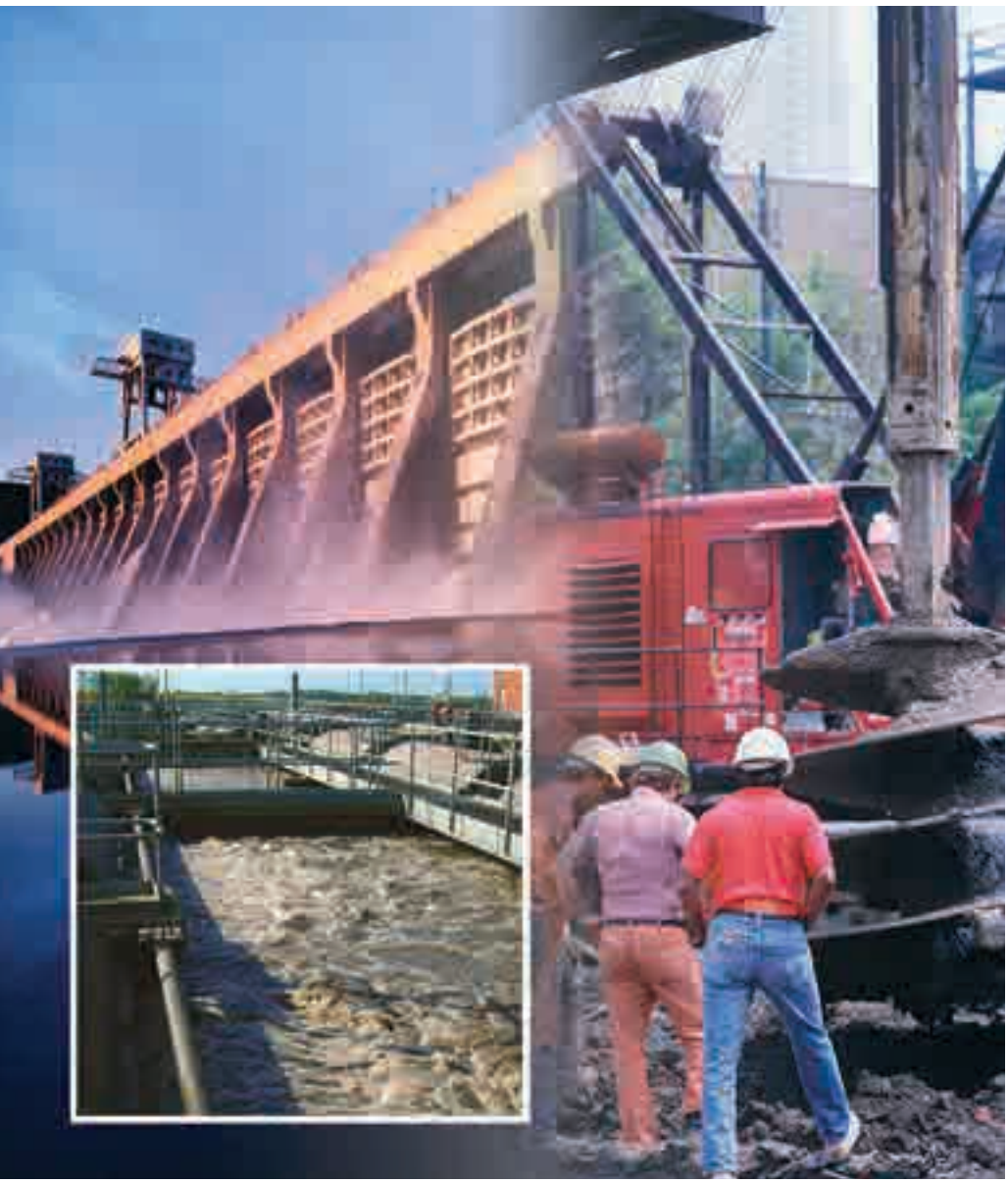
You will find a Booking form for this meeting on the facing page. Remember, the last day for registrations is **Monday 16 December 2002**, so hurry to be sure of a place at this important meeting!

This conference will help microbiologists appreciate the very significant contribution they can make to modern engineering practices

MICROBIOLOGY of ENGINEERED ENVIRONMENTS

Incorporating 2nd International Congress on Microbiology in Civil Engineering

University of Guildford, Surrey, UK • 14 - 17 July 2003



THE 2003 SUMMER CONFERENCE will be held 14th - 17th July, 2003 at the University of Surrey, Guildford. This is intended to present an opportunity for cross-disciplinary dialogue between microbiologists and engineers of all persuasions. Both disciplines have had major impacts on public health and this will form the focus of an opening debate at the first evening mixer. Speakers who have already agreed to give invited papers include international experts covering the whole range of topics, both academics and those actively engaged in engineering projects and processes. The conference will attract a wide-ranging audience demonstrating just how important microbes and their activities can be in almost all engineered environments and help microbiologists appreciate the very significant contribution they can make to modern engineering practices.

Information

A Booking form for this conference will be available in the New Year on the Society website as well as in the next (March 2003) issue of ***Microbiologist.*** Meanwhile, if you would like further information about the conference, or wish to contribute please call the Society Office on 01234 32666.
If you would like to present a paper or a poster within a relevant subject area please refer to the "Call for Papers" panel on the opposite page.

Call for papers

During the conference there will be ample opportunity to present offered papers and posters within a relevant subject area, as well as a session for student oral paper and poster presentations. We will be pleased to receive ideas for offered papers and posters in relevant subjects areas.

Abstracts should not exceed 500 words and the contents should include the aims and objectives of the work, brief methodology, results, conclusions, and implications for the work. Please indicate whether you would prefer a poster or oral presentation.

Abstracts should ONLY be sent by email to the Society Office with the subject line "Summer conference submission" and marked for the attention of Lynne Boshier.

email: lynne@sfam.org.uk

The closing date for submissions is Friday 9 May 2003

Outline programme

Pre-meeting Debate

- **"Modern public health: a result of practical engineering or microbiological science?"**

Introductory overview

- **Biofilms and consortia: central themes in engineered systems**

Microbiology of Wastes, Landfill and Remediation

- **Constructed wetlands: BOD and pathogen removal**
- **Waste stabilisation ponds: their application in the UK and World-wide**
- **Permeable reactive barriers in remediation.**
- **Membrane bioreactors for waste and leachate remediation**
- **Compost and composting in remediation technologies**
- **Policy and regulatory aspects of soil and groundwater bioremediation**
- **Natural attenuation and bioremediation of oil-contaminated sites.**
- **Microbial metal winning, bacterial mining and reclamation of metals**

Water and Wastewater Processes

- **Algae in reservoirs, filtration problems and cyanobacterial toxins**
- **Polyaromatic hydrocarbon mobilisation by biofilms in water distribution systems**
- **Engineering design to eliminate microbial/biological problems in water mains**
- **Novel disinfection systems; free radicals to high frequency pulses**
- **Sewer septicity**
- **Controlling microbial populations in waste water treatment**

Buildings and the Construction Industries

- **Commissioning and microbiological problems in buildings' water services**
- **Cooling towers and associated sand-filters**
- **Toxigenic and allergenic moulds in buildings and their air-conditioning systems**
- **Microbial activities in tunnels and groundworks**
- **Wooden constructions: what happens now all the biocides are banned?**
- **Microbial interactions with structural stone and concrete.**
- **Coatings and claddings to protect surfaces from microbial attack**

Essay competition

To complement the theme of this year's summer conference on **"Microbiology of Engineered Environments"** the Society is once again running a Student Essay Competition. The essay should be entitled ***"Who should manage bioremediation, microbiologists or engineers?"*** Entries should be word-processed, no longer than 1500 words and submitted to the Society office **no later than Friday 18th April 2003**. The entries will be judged by a panel of experts, including some of the key speakers. The winning essay will be published in ***Microbiologist'*** and the author will receive a certificate and £50 prize.

"A little bit of dirt does you good"

Summer Conference 2002 Essay Competition Winner

IN the western world the presence of dirt and germs is viewed as a bad thing with people going to increasing lengths to eliminate both from their surroundings. This can be demonstrated by looking at the large number of antimicrobial cleaning products now available for household use. Recent research suggests that this may not be as wise as it first seems. Increasing incidences of both allergy and auto-immunity are now being closely linked to decreased contact with microorganisms (Hamilton, 1998).

Congratulations to **Miles Roe**, a recent graduate of the University of Bradford, winner of our 2002 summer conference student essay competition. Miles is pictured receiving his prize and certificate from one of his microbiology tutors, Dr Hilary Dodson.

Commonly quoted studies compare the incidences of allergy in children that live in "dirty" environments or are exposed to large numbers of microbes with children that live in cleaner environments or are exposed to much smaller numbers of microbes. In the vast majority of cases there is a significantly smaller incidence of allergic diseases such as asthma, eczema and hay fever in the children that live in the dirty environment (Strachan, 1999).

The immune system has developed with constant stimulation from the environment in the form of exposure to microbial antigens (molecules identifying the microorganism as foreign to the immune system). It has been compared to the brain in that it needs to learn from its environment in order to function correctly (Rook & Stanford, 1998). The "hygiene hypothesis" states that when this stimulation is greatly reduced or removed entirely the immune system malfunctions (Strachan, 1989). As the immune system develops most rapidly in the first years of life early antigen deprivation will have the largest effect.

Normally the first exposure to an infectious agent will prime the immune system so that second and subsequent responses to the same organism will be faster and more effective - the immune system has "memory". It is widely known that a person will only very rarely suffer from a disease such as measles more than once. If the same person is exposed to the measles virus again the immune response will be so fast and intense that the virus particles will be destroyed before the disease gets a toehold and the person will not even notice the exposure. In addition to this highly specific response, other long lasting non-specific systemic effects on the immune system have been discovered. Studies have shown that children that have naturally recovered from measles are half as likely as children vaccinated against measles to suffer from atopy (hypersensitivity) or allergic reactions to house dust mite (Rook & Stanford 1998). This indicates that recovery from the disease confers a protective effect that vaccination does not. Measles is a serious disease that causes many deaths each year but with less serious diseases the benefit of developing an immune response without artificial aids may be significant.

Several workers have proposed that the malfunction in the immune system is due to an unbalancing of two of its pathways (Rook & Stanford, 1998). These are the T helper 1 (Th1) and T helper 2 (Th2) pathways, and they are mutually inhibitory. The Th2 pathway is dominant in the foetus and the newborn infant. It is also the pathway that causes the symptoms of hyper-responsiveness seen in allergy (Settipane & Settipane, 2000). The Th1 pathway is strengthened by repeated stimulation by microbial antigens and when exposed to sufficient microbial stimulation will increasingly dominate the Th2 pathway with age. If microbiological contact is limited the Th1 pathway will not be strengthened and the immature immune system will persist into adult life. This can lead to increased incidences of asthma, hay fever and other allergies (Rook, 1998). Unfortunately, the majority of modern vaccinations (with the exception of the BCG vaccine against TB) also work by stimulating a response from the Th2 pathway so these may also contribute to the increased incidence of allergy.

This theory of a shift from a Th1 to a Th2 response does

not adequately explain the increase in autoimmunity seen in the same communities as the increase in allergy, since autoimmunity is usually due to a Th1 response. Experiments using mycobacteria, which are present in the soil and untreated water, appear to show that exposure to them can protect against allergy and autoimmune diseases such as type 1 diabetes. A mechanism has been suggested whereby exposure to mycobacteria promotes production of T regulatory cells that modify both the Th1 and Th2 responses (Black, 2001).

Another theory suggests that infection by parasitic helminths may protect against allergic disease (Yazdanbakhsh *et al*, 2001). Epidemiological studies show that allergic diseases are rare in areas where helminth parasitism is common. This could indicate that either the populations in these areas have some protective mechanism from allergy that makes them susceptible to helminth infection or that the actual infestation protects from allergy. Without treatment helminth infections are long lasting and stimulate a Th2 response rather than the Th1 response elicited by other microorganisms such as bacteria and viruses. As helminths stimulate the Th2 pathway it would be reasonable to expect helminth infections to cause an allergic-type response. This doesn't happen though, instead a dulled Th2 immune response is seen, which also seems to reduce the response to allergens that the immune system has already been primed for. Somehow helminth infection reduces the allergic response in people normally susceptible to it. It is unclear whether this is due to the organisms or if it is a protective mechanism of the immune system.

Apart from effects on the immune system some bacterial species have other unexpected properties. There is some evidence that *Lactobacillus acidophilus*, which is present in milk and some yoghurts, can act to reduce cholesterol levels and protect against some cancers (Mital & Garg 1995). It is also able to colonise the human gut effectively and suppress pathogenic organisms thus providing protection against foodborne illness.

It seems that we pay a heavy price for the desire to live in an environment free from microbes of any sort. Although we may reduce the incidence of infectious diseases other types of disease such as autoimmunity and allergy appear to be on the rise as a direct consequence of this. There is also the danger that beneficial bacteria are eradicated along with any health promoting effects that they may have.

Miles Roe
University of Bradford, UK

References:

- Black P (2001) **Why is the prevalence of autoimmunity increasing?** *Trends in Immunology* **22**:354
- Hamilton G (1998) **Let them eat dirt.** *New Scientist*. **2143**:26-31
- Mital B K & Garg S K (1995) **Anticarcinogenic, hypocholesterolemic, and antagonistic activities of *Lactobacillus acidophilus***. *Critical Reviews in Microbiology* **21**:175-214
- Rook G A W (2000) **Clean living increases more than just atopic disease.** *Immunology Today* **21**:249
- Rook G A W & Stanford J L (1998) **Give us this day our daily germs**. *Immunology Today*. **19**:113-116
- Settipane R J & Settipane G A (2000) **IgE and the allergy-asthma connection in the 23-year follow-up of Brown University students**. *Allergy & Asthma Proceedings* **21**:221-5
- Strachan D P (1989). **Hay fever, hygiene and household size**. *British Medical Journal* **299**:1269-60
- Strachan D P (1999). **Lifestyle and atopy**. *Lancet* **353**:1457-8
- Yazdanbakhsh M v.d.Biggelaar A & Maizels R M (2001). **Th2 responses without atopy: immunoregulation in chronic helminth infections and reduced allergic disease**. *Trends in immunology* **22**:372-7

Bacteria Broadcast Over the Airwaves

An article published in the June edition of ***Laboratory News*** reports a team of scientists at QinetiQ, formerly the larger part of DERA, has found that bacteria can transmit information through air

THE discovery is thought to be of significant importance in the growing problem of the resistance of bacteria to antibiotics, and in particular preventing the growth of biofilms, which often cause infection in surgical prostheses and catheters.

That bacteria can exchange chemical messages by releasing substances into the medium in which they are growing is well-known, but scientists Professor Alan Parsons and Dr. Richard Heal at QinetiQ's Winfrith facility, believe they can also send signals through the air-telling other bacteria to turn on their resistance genes or to activate some other resistance mechanisms.

Professor Parsons and Dr. Heal conducted their experiments using a Petri dish divided into two compartments, connected by a 5mm air gap between the top of the wall and the lid. In one compartment they placed drops of *E. coli*, together with various antibiotics. When the other compartment was empty, the bacteria died, killed by the antibiotics. However, if thriving colonies of *E. coli* were placed in the other compartment, the first lot of bacteria not only survived, but also began to multiply. Yet, if the gap between the compartments was sealed, the bacteria in the first compartment died. Professor Parsons and Dr. Heal concluded the bacteria in the second compartment must have been sending some kind of airborne 'survival' signal, probably in the form of a volatile chemical.

"We have demonstrated that a healthy colony of *E. coli* bacteria generates a signal that helps a neighbouring colony to resist attack from at least three common antibiotics: ampicillin, tetracycline and rifampicin. The next step is to identify the signal," said Dr. Richard Heal. "When the signal is identified it might be possible to block it, and so stop new colonies of bacteria (biofilms) growing or stop them developing resistance to antibiotics."

BS EN PUBLICATION

BS EN 13641:2002 Elimination or reduction of infection related to in vitro diagnostic reagents. *No current standard is superseded.*

DRAFTS FOR PUBLIC COMMENT

02/562438 DC Draft British Standard BS EN 14476 Chemical disinfectants and antiseptics - Viricidal quantitative suspension test for chemical disinfectants and antiseptics used in human medicine - Test method and requirements (phase 2 step 1).

02/706106 DC Draft ISO 11290-1/A1 Microbiology of foods and animal feeding stuffs - horizontal method for the detection and enumeration of Listeria monocytogenes - Part 1: Detection method.

02/70107 DC Draft ISO 11290-2/A1 Microbiology of foods and animal feeding stuffs - Horizontal method for the detection and enumeration of Listeria monocytogenes - Part 2: Enumeration method. ***Comments to all three were required by August 31st, 2002.***

CEN EUROPEAN STANDARD

Water quality - Detection and enumeration of *Pseudomonas aeruginosa* by membrane filtration.

SPECIAL ANNOUNCEMENTS

BS 6068: Water quality.

BS 6068-1.2:1997 Glossary - Additional terms relating to types of water and treatment and storage of water and waste water, and terms used in sampling and analysis of water.

BS 6068-1.7:1997 Glossary - An additional 51 terms.

BS 6068-1.9:1998 Glossary - Alphabetical list and subject index.

Comments were invited to be submitted by 31st May on whether these standards should be confirmed unchanged, revised or withdrawn. The equivalent international standards are under review by the responsible ISO committee. If no comments were received to the contrary by BSI the UK would recommend that the standards be confirmed.

ISO/DIS 13641: Water quality - Determination of inhibition of activity of anaerobic bacteria.

ISO/DIS 13641-1.2 Inhibition of anaerobic digestion. *A second enquiry stage DIS has been issued under document reference 02/561596. Copies of this document may be obtained on request from Dr. R.A. Wellings at BSI Head Office.*

ISO/DIS 13641: Water quality - Determination of inhibition of activity of anaerobic bacteria.

ISO/DIS 13641-2.2 Test at low biomass concentrations. *A second enquiry stage DIS has been issued. The UK has no interest in this draft. Copies of the document may be obtained on request from Dr. R.A. Wellings at BSI Head Office.*

NEW WORK STARTED

BS EN XXXX Development, validation and routine control of sterilization processes - Low temperature steam and formaldehyde.

BS ISO 13408-6 Aseptic processing of healthcare products - Part 6: Isolation and barrier technologies.

BS EN ISO 15225 Amendment 1: Nomenclature - Specification for a nomenclature system for medical devices for the purpose of regulatory data exchange.

BS EN PUBLICATION

BS EN 12780; 2002 (Also numbered as BS6068-4.15:2002) Water quality - Detection and enumeration of *Pseudomonas aeruginosa* by membrane filtration. *No current standard is superseded.*

BS ISO IMPLEMENTED BY AMENDMENT

BS ISO 6107-8:1993 Water quality - Vocabulary - Part 8. Implementation of international standard ISO 6107-8 by amendment to BS 6068-1-1.8:1993.66 terms have been added to the Glossary in amendment 1. The amendment is not available separately and the new standard should be ordered by the reference BS ISO6107-8:1993.

BS EN PUBLICATIONS

BS EN 592:2002 Instructions for use for in-vitro diagnostic instruments for self-testing. Supersedes BS EN 592:1995

BS EN 13532:2002 General requirements for *in-vitro* diagnostic medical devices for self-testing. *No current standard is superseded.* Also published as CEN European Standard EN 13532:2002

BS EN 13640:2002 Stability testing of in-vitro diagnostic reagents. *No current standard is superseded.*

UPDATED BRITISH STANDARD

BS 6068: Water quality

BS 6068 - 1.3:1993 Glossary - An additional 90 terms. Amendment 1. This amendment renumbers BS 6068 1.3:1993 as BS ISO 6107-3:1993.

The amendment is not available separately. It should be ordered under the reference BS ISO 6107.3:1993

NEW WORK STARTED

BS EN ISO 11138: Sterilization of healthcare products - Biological indicators.

BS EN ISO 11138: General requirements.

BS EN ISO 11138-2: Biological indicators for ethylene oxide sterilization.

BS EN ISO 11138-3: Biological indicators for moist heat sterilization processes.

BS EN ISO 11138-3: Biological indicators for dry heat sterilization processes.

BS 3N ISO 11138-4: Biological indicators for low temperature steam - formaldehyde sterilization.

As ever, we are indebted to **David Post** for compling the **BSI UPDATE**

DRAFT FOR PUBLIC COMMENT

02/707924 DC ISO 21567
Microbiological examination of food and animal feeding stuffs - Horizontal method for the detection of *Shigella* species. *Comments to be addressed to BSI Head Office by 31st. October 2002.*

BS EN PUBLICATIONS

BS EN ISO 6579:2002. Microbiology of food and animal feeding stuffs - Horizontal method for the detection of *Salmonella spp. This supersedes BS EN 12824:1998.The standard is also published as an ISO document, ISO 6579:2002 (Edition 4)*

AMENDMENT TO A BRITISH STANDARD

BS EN 1040:1997. Chemical disinfectants and antiseptics - Basic bactericidal activity - Test method and requirements (phase 1) CORRIGENDUM 1 AMD 13799. The updated standard should be ordered by the reference BS EN 1040:1997

BRITISH STANDARDS PROPOSED FOR CONFIRMATION

BS 5213:1975 Specification for medical specimen containers for microbiology.

BS 7755: Soil quality

BS 7755-1.1:1997 Terminology and classification - Terms and definitions relating to the protection and pollution of soil.

BS 7755-4.4.1:1997 Biological methods - Effects of pollutants on microbes - Determination of soil microbial mass - Substrate-induced respiration method.

BS 7755-4.4.2:1997 Biological methods - Effects of pollutants on microbes - Determination of soil microbial mass - Fumigation-extraction method.

BS 7755-4.4.3:1997 Biological methods - Effects of pollutants on microbes - Determination of nitrogen mineralization and nitrification in soils and the influence of chemicals on these processes.

BS 7755-4.4.4:1997 Soil quality - Biological methods - Effects of pollutants on microbes - Laboratory incubation systems for measuring the mineralization of organic chemicals in soil under aerobic conditions.

BS EN 1658:1997 Requirements for marking of in-vitro diagnostic instruments.

BS EN 1659:1997 *In-vitro* diagnostic systems - Culture media for microbiology - Terms and definitions.

NEW WORK STARTED

BS 5726 Microbiological safety cabinets - Recommendations.

DRAFTS FOR PUBLIC COMMENT

02/563809 DC Draft British Standard BS EN 980 Graphical symbols for use in the labelling of medical devices *(Expected to supersede BS EN 980:1997).* Comments on this document were required by 14th October, 2002.

ISO DOCUMENT

ISO 10718:2002 (Edition 2) Cork stoppers - Enumeration of colony-forming units of yeasts, moulds and bacteria capable of growth in an alcoholic medium.

ISO 15223: Medical devices - Symbols to be used medical device labels, labelling and information to be supplied. AMENDMENT 1:2002 to ISO 15223:2000. This will not be implemented as a British Standard - BS EN 980:1997 Graphical symbols for use in the labelling of medical devices- takes precedence.

David Post

Water quality at record levels!

WATER quality rose to record levels this year, with 98.5 per cent of English coastal and freshwater bathing areas meeting a European standard.

Out of a total of 407 English coastal and freshwater bathing areas, 401 passed the main tests set by a European Commission directive. Results for the UK were also the best to date, with 98 per cent reaching the required standard, up from 95 per cent in 2001.

Water Minister Elliot Morley said the UK now has bathing water quality to match the best that Europe has to offer. He also emphasised the need to keep improving if the UK is to meet the much higher standards that a new directive is likely to require.

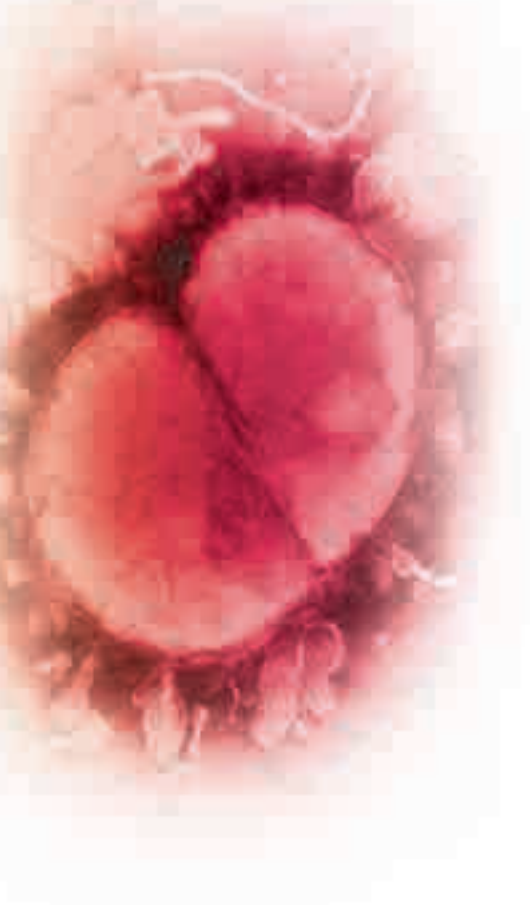
"We must continue our efforts towards further improvement and give greater emphasis to tackling all sources of diffuse pollution, especially livestock and fertilizer from agricultural land,"he said, and added: "Our water policy document ***'Directing the Flow'*** published last week indicated that addressing diffuse pollution from agriculture is the single biggest challenge for improving water quality and that around half of bathing waters in England are affected by diffuse pollution. We have launched a cross-cutting review, with the aim of developing in consultation with stakeholders a package of cost-effective policy measures".

Ongoing investment totalling £600m in England and Wales until 2005 is aimed at achieving more improvements in bathing water quality. It is targeted at more than 100 sewage treatment works and several hundred storm overflows.

To read the document 'Directing the Flow' in full visit the Department for Environment Food and Rural Affairs (DEFRA) at: http://www.defra.gov.uk/environment/water/strategy/index.htm

Locating a stress sensor!

Over its mostly short life span a bacterial cell is inevitably prone to physical and chemical environmental hardships. This is commonly the case when food processors apply heat, cold, salt, etc, to ensure the safety of their produce or when the human body expresses defence mechanisms to combat bacterial infection.



SINCE bacteria have decided not to be insensitive about such serious situations, they are used to developing combating responses to aid survival during stress. Recent emergence of pathogenic microorganisms that are able to resist some food preservation regimes, e.g. acid resistance of *Escherichia coli O157*, make the need for understanding the mechanisms of bacterial stress responses not only necessary for fundamental knowledge but for practical purposes as well.

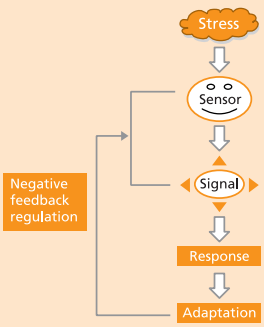


Fig1. General model illustrating the flow of environmental stress response in bacteria.

Figure 1 illustrates a rather simplified model of the most plausible and popular stress response cascade. In this, a bacterial structure senses the unfavourable change in the environment (stress) and emits a signal that induces the expression of cellular mechanisms in order to cope with the emergent hardship. Attaining satisfactory adaptation state would stimulate a feedback regulation to switch off or slow down the signal emanation. Obviously, sensing stress is the start point. While this is reasonably certain, various conflicting rationales have been introduced to define where stress is sensed by cell.

Stress sensing via cytoplasmic membrane.

Because of its location and components, the cytoplasmic membrane has been traditionally suggested to sense environmental changes through certain proteins that expand into the periplasm to interact with stress. The introduction of the two-component signal transduction model with its fascinating and elegant concepts has been useful to explain the mechanism of the membrane in some cases. There are two main components in this system: sensor and regulator. The sensor is located in the cytoplasmic membrane and contains an input domain that senses the stimulus and passes it to a transmitter (**figure 2**). Through a series of phosphorylation and dephosphorylation reactions, the latter forwards a signal to the regular, located in cytoplasm, which induces the expression of certain genes involved in the stress response.

This system was found to serve well in mediating responses to phosphate or nitrogen starvation, responses to oxygen limitation, responses to changes in carbon, nitrogen sources, and very recently it was shown to be involved in heat response. However, some people have not been happy with such an appealing story and have provided evidence that it is not necessarily the membrane.

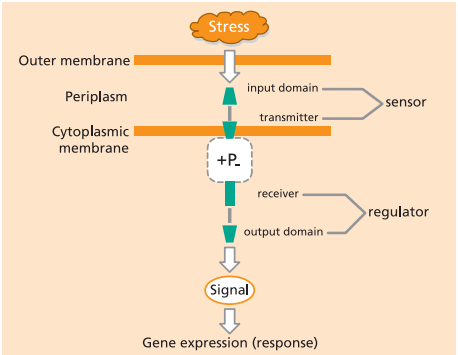


Fig2. Involvement of two-component signal transduction system in sensing environmental changes and generating a response.

Could ribosomes sense stress?

Given that it is at the ribosome that gene messages are translated into proteins, their role could be envisaged to be rather effective at later stages in the stress response cascade. However, the intriguing observations of VanBogelen and Neidhardt demonstrated that ribosomes can fulfil the sensor's motifs during heat or cold shock. They found that the addition of certain antibiotics that target ribosomes stimulated the expression of the same arrays of proteins induced on temperature up- or downshift (the so-called heat or cold shock

proteins). Startlingly, the patterns of the antibiotic-induced proteins simulated those of mild or severe temperature shift proteins depending on the drug concentration.

The heat or cold shock proteins (HSPs or CSHs) have been presumed to aid a cell's adaptation by allosterically preventing and / or repairing damage to cellular molecules following abrupt temperature change. This could lead to the situation represented in **figure 3**.

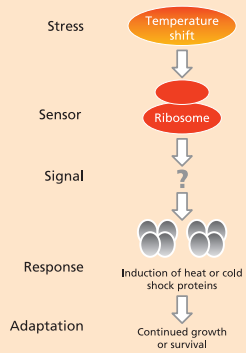


Fig3. Proposed role of ribosomes in stress sensing.

The increase in the synthesis of these proteins following temperature shock was found to be transient, which may refer to the feedback-repressing signal. Recently, HSPs and CSPs were shown to be involved in facilitating ribosomal jobs during stress; initiation of translation, coupling transcription with translation or recycling ribosomes after the completion of polypeptide synthesis. This may reveal another dimension in the mechanism - that ribosomes sense stress and generate signal since they need the response.

How far could ribosomes be implicated in sensing other stresses? Another research group (Zhang *et al.*) have recently revisited this model and hypothesized that ribosomes could be a general sensor for various environmental assaults experienced by *Bacillus subtilis*. Indeed, the evidence for this was indirect.

Sensing stress extracellulary!

Based on a series of related studies undertaken by his group, Professor Robin Rowbury developed a rather revolutionary concept of stress sensing by *Escherichia coli*. He suggested that bacteria would not wait until the stressing stimulus got through to trigger intracellular components; i.e. membrane proteins or ribosomes as this would delay the response to stress. Instead, cells may constitutively synthesise extracellular proteins that could detect environmental stress in the growth medium. These proteins have been called "extracellular sensing components (ESCs)". They are presumed to be activated by stress which changes their structure as to be able to interact with cell surface receptors inducing appropriate response. At this stage, ESCs are termed extracellular induction components (EICs)- in other words, ESCs are precursors of EICs. Because of their diffusibility, EICs can also travel to other unstressed cells and serve as "alarmones" of anticipated stress.

This model proved useful to explain some interesting observations found in Rowbury's lab; among them was the increase in acid tolerance of *E. coli* following previous exposure to mildly low pH (acid habituation). Another observation was the ability of EICs, produced by acid habituated cells, to confer acid endurance on unadapted organisms. Relaying upon the observation that agents which suppress the synthesis of ESCs, and accordingly EICs, also retard acid habituation, it was suggested that these extracellular components were necessarily involved in acid habituation phenomenon. A major reservation of this conclusion is the completion of acid adaptation within 20-30 minutes of an organisms exposure to mildly low pH (mostly pH 5), while in most experiments, the extracellular components were prepared from cultures grown at the same pH for 90 or 120 min.

Beside the need for a more precise structural description of ESCs and EICs, and resolving whether different growth media formulas could affect their synthesis and function, more details on the induction of cell response by the EICs are required. There is no obvious evidence that EICs are sensed by cell surface components and if the alternative were cytoplasmic membrane sensors, the model would lose a prime advantage which is the early alert of environmental insults.

Single or multi stress sensors?

In each of the above three models, proposing a stress sensing mechanism was the outcome of studying bacterial responses under certain environmental changes; e.g. temperature shock for ribosome sensing. This raises the question of whether there are different sensors for different stresses. "Yes" might be the answer in some contexts of bacterial behaviour. When bacteria are grown in differently supplemented media, their rate of growth changes correspondingly with changes in the macromolecular composition of the cells. Changing the growth temperature can also effect this variation in growth rate, yet this would not involve similar modifications in cellular molecules. Slowing down the growth rate in poor media or under unfavourable temperatures could be seen as an adapting mechanism given that rapidly growing cells are more vulnerable to stress than dormant ones. So, it seems that different mechanisms might serve during various stresses to end up with an adapting response. It is also possible that these three systems might coordinate together for sensing environmental changes.

Walid M El-Sharoud
School of Food Biosciences,
The University of Reading, UK

Further reading:

■ Neidhardt, F.C. 2002. **Microbial reaction to environment: bacterial stress responses revisited in the genomic-proteomic era**, p. 1-18. In D.A. Hodgson and C.M. Thomas (ed.), Signals, switches, regulons and cascades: control of bacterial gene expression. *Cambridge* University Press, Cambridge.

■ Parkinson, J. S. 1995. **Genetic approaches for signalling pathways and proteins**, p. 9-23. In J. A. Hoch and T. J. Silhavy (ed.), Two-component signal transduction. *ASM Press,* Washington, D.C.

■ Rowbury, R. J. 2001. **Cross-talk involving extracellular sensors and extracellular alarmones gives early warning to unstressed *Escherichia coli* of impending lethal chemical stress and leads to induction of tolerance responses.** *Journal of Applied Microbiology* **90**: 677-695.

■ VanBogelen, R. A. and F. C. Neidhardt.1990. **Ribosomes as sensors of heat and cold shock in *Escherichia coli.*** PNAS 87:5589-5593.

■ Zhang, S., J. M. Scott and W. G. Haldenwang. 2001. **Loss of ribosomal protein L11 blocks stress activation of the Bacillus subtilis transcription factor sigma (B).** *J. Bacteriol.* **183**: 2316-2321.

The President's Fund Reports

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 **MUST be made on the official application form**, available **ONLY** from the Society Office.

12th International Biodeterioration & Biodegradation Symposium Prague Czech Republic, July 14th to18th 2002

Described as "a showcase of 1970s flamboyance" and previously host to the likes of Colonel Gadaffi and BB King, the Hotel Praha provided a suitably auspicious backdrop to the triannual meeting of the International Biodeterioration Society (IBS). The conference started well with a plenary lecture from Mohammad Sondossi, followed by a more than generous welcome reception enjoyed by all. The remit of the IBS is to encourage and bring together people interested in the biodeterioration and biodegradation of compounds ranging from concrete to olive oil. Lectures started on Monday morning with sessions covering biodegradation of persistent compounds and the biosorption of heavy metals. The afternoon brought an entertaining session concerning the use and regulation of biocides covering microbial resistance (P. Gilbert), cyanobacterial bloom (G. Morton) and dental water systems (J. Walker). The coffee break allowed a change of session and some interesting talks concerning the biodegradation of mixed chemical effluents (C. van der Gast), herbicides (Ji-Dong Gu) and metal working fluids (S. Dooley). Monday night brought a trip into the beautiful city of Prague and after hunting for a table for 16 we settled down in a quiet taverna and enjoyed some Czech cuisine.

Tuesday saw the conclusion of the biodegradation of persistent compounds session and some interesting talks on the hot topic of GM organisms and their use in bioremediation. The plan for the free afternoon was to take in the sights of Prague Castle and take many photos, however rain stopped play and much to our dismay (!) we found ourselves in one of the many bars enjoying beer at 30p a pint. Wednesday brought 4 sessions covering; industrial biofouling, the use of genetically modified organisms in bioremediation, phytoremediation and a very picturesque session looking at the biodeterioration of building materials and cultural property. The afternoon brought a session dedicated entirely to those of us showing posters. The poster session was a very valuable experience allowing everyone to meet and discuss common troubles and triumphs. Wednesday night brought the symposium hog roast at the beautiful Strahov Monastery. With plenty to eat and drink it was only a matter of time before we were joining in with the Czech traditional dancing.

Thursday morning saw the final sessions come to a close and the 120 plus posters recovered by their authors. With just enough time for one last trip into Prague we visited the Castle and the magnificent St Vitus Cathedral.

I am most grateful to the ***sfam*** for the financial assistance they gave me enabling my attendance at this meeting and for the opportunity to make to make new contacts and new friends. □

Sarah Barret
The University of Manchester

Further reading:

Anyone interested in finding out more about the **International Biodeterioration Society** can find information at the website www.biodeterioration.org

Another member who attended the same meeting reports:

The meeting was divided into sections of biosorption and bioaccumulation of heavy metals, biodegradation of persistent compounds, biodeterioration of building materials and cultural property, industrial biofouling and its effects on water quality, biocides, and microbial corrosion and biofilms, within others. There were over 70 oral presentations and 130 posters covering the various aspects.

Of particular interest for my research were the lectures and poster presentations on biofilms, biofouling and biocorrosion. Besides these, I had the opportunity to attend to other interesting lectures on some related topics as biosorption and bioaccumulation of heavy metals and the use and regulation of biocides. I particularly enjoyed the lectures presented by Drs. H.C. Flemming, P. Gilbert and I. Beech, from which I had experienced points of view on relevant topics related to my work. The variety of subject covered by the lectures I attended broadened my view on subjects and potential applications of my present, as well as my future work on the interactions between microorganisms and interfacial electrochemistry.

I presented a poster including my most recent results on the use of Electrochemical Impedance Spectroscopy in conjunction with macromolecules quantification to monitor both, the growth of biofilms of *P. fluorescens* on copper, and the related effect on corrosion reactions. It allowed me to discuss my results with more experienced researchers in the field, as well as with other young scientists like me. I was also a co-author in other poster presentation on bioremediation of a crude oil extraction waste.

Since delegates from the European Union as well as from North and South America were present there was ample opportunity to initiate possible collaborations andI made some interesting contacts from which I hope to find a synergic partner to enhance my future work.

The venue for the symposium was excellent and people from the organizing committee worked ward on each detail. I would like to specially thank to Mr. Pavel Jenc from the committee, for the help with hostelling and travelling to Prague.

I would like to thank the Society for the grant from the President's Fund, which together with a **FEMS Young Scientist Grant** enabled me to attend this very useful Symposium in Prague.

Juan Pablo Busalmen.
Universidad Nacional de Mar del Plata, Argentina

The 7th International Mycological Congress Oslo, Norway August 11th - 18th, 2002

The Congress opened on Sunday evening with a ceremony in the beautiful Oslo Concert Hall, including music by a string quartet and a welcome from the Norwegian minister of education and research, Kristin Clemet. The president of the International Mycological Association, Dr. Meredith Blackwell, also spoke, laying out the various challenges faced by modern mycologists including blending molecular techniques with traditional mycological methods and attempting to estimate global fungal biodiversity. The congress was attended by approximately 1200 delegates from every part of the world, with especially large contingents coming from the USA, Germany, Japan, and, of course, Norway and the other Scandanavian countries. The next day, we were welcomed in the impressive 1930s Oslo City Hall (known as the Radhus) by the mayor of Oslo. This imposing building plays host each year to the Nobel Peace Prize ceremony, and free tours of the building, with interpretation of the many murals, were offered.

The venue for the Congress was the University of Oslo, which lies on a large campus to the north west of the city centre. Most of the delegates including myself were housed in the city centre, and the city transport services to the university were most impressive. The Congress was divided into five main themes: biodiversity and conservation; systematics, phylogeny and evolution; pathogens and nuisances, food and medicine; population dynamics and ecology; and cell biology and physiology, with particular specialised sessions within each theme. Talks from each theme were held in parallel each day, so there was a good choice of options on offer during the Congress.
I concentrated mainly on talks concerned with biodiversity and ecology, as my own research is concerned with microbial soil biodiversity. The fungal biodiversity symposium on the second day was particularly interesting. The diversity and distribution of fungi in habitats ranging from soil to arthropods was discussed, finishing off with an informative summary by J P Schmidt of the current state of our knowledge of fungal diversity. He discussed the difficulties inherent in trying to estimate fungal diversity by drawing inferences from already known biodiversity. Also, I found the sessions on mycorrhizal biology really informative, particularly the developments in functional genomic studies, and in fungal-bacterial interactions.

There were 2 main poster sessions on separate days, with my own poster being shown with around 100 others in the session on population dynamics and ecology. There was a parallel session on fungal diversity and conservation at the same time. My poster was titled ***'Effect of grassland plant species on fungal soil communities; a microcosm study'***, and I used a range of molecular community techniques to show differences between soil communities. The session was very well-attended, and it was wonderful to get feedback from some very experienced mycologists, and to see how other delegates addressed similar problems. These informal sessions were one of the best parts of the Congress (together with the beer tent, of course!). The co-sponsored British Mycological Society and Mycological Society of America reception that evening was also a chance to get some more expert advice, along with some delicious Norwegian food!

Wednesday started with more talks about mycorrhizal and endophytic fungi, chaired by Drs. Rasmus Kjoller and Soren Rosendahl from the University of Copenhagen. Wednesday afternoon was left free for sightseeing, with delegates heading off to take in the many cultural delights of Oslo. The weather was most cooperative, with sunny skies and temperatures well in the 20s, so after a session in the Kon-Tiki Musuem,

I joined many others in heading off to the islands of the fjord for a swim. The sessions on Thursday and Friday focused more on fungal systematics, genetics and physiology, with a wide variety of talks and the second poster session. This was an opportunity for me to listen to talks in areas less directly related to my own work. A particularly interesting session was entitled 'The Promotion of Mycology', sponsored by the British Mycological Society.

The Congress finished up on Saturday morning with a closing session, where plans for the International Mycological Congress 8, to be held in Cairns, Australia, were revealed. Hopefully I will be in a position to attend, as I really enjoyed this Congress. This was my first major international conference, and to start with I found the sheer number of delegates a little overwhelming, but as we broke up into smaller groups it was less intimidating and through the week I was able to meet many other postgraduates and university academics. Attending the congress has taught me a lot, not only about many areas of mycology, but also about networking with other scientists.

Nabla Kennedy

Could YOU benefit?

The President's 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.

For further information see the panel on page 36 or visit the website at :

www.sfam.org.uk

American Society for Microbiology 2nd Student Institute in Preparation for Careers in Microbiology,

Madison, Wisconsin, USA, August 3 - 9, 2002.

Twenty-one participants from all over the USA came together to participate in workshops and seminars to help prepare them for careers in microbiology.

The workshop is a relatively new initiative by the ASM education committee and consisted of presentations by invited speakers and faculty members and workshop sessions. Prior to attending the institute, participants were asked to prepare a 10-20 page grant proposal to be used in the grant writing sessions and a short 10 minute presentation of the research. The institute was arranged around an intensive 5 day program of workshops and presentations starting at eight-o-clock and finishing at ten in the evening.

Dr Jorge Escalente-Semerena (Department of Bacteriology, UW) opened the institute on Saturday night and gave an overview of its format and aims. The aim of the institute was to provide graduate students (Ph.D.'s) and post-docs an opportunity to meet with experienced microbiologists from a broad range of careers for the sole purpose of the development of the student's careers. During the institute the faculty spoke candidly about their own career paths and gave recommendations and views of the student's future opportunities. Workshop sessions focussed on developing grant writing skills and presentation techniques. Following dinner on Saturday night, Dr Richard Burgess (UW) gave an overview of his career in microbiology during his presentation entitled 'Marketing yourself with a Ph.D. in microbiology'. His presentation was both entertaining and informative with him emphasizing the importance of leadership and management skills for microbiologists who become heads of laboratories. He also discussed the relative pros and cons of academic and industrial careers in microbiology. He finished by reviewing alternative careers such as medical writing or a career in law as a patent lawyer.

The Sunday morning session began with an overview of the grant-making enterprise from Dr Robert Kadner (University of Virginia). Dr Kadner is a veteran of many National Institutes of Health (NIH) study sections where grants are reviewed and funding decisions made. This presentation covered the 'nuts and bolts' of grant writing (using NIH as a model) with Dr Kadner sharing his knowledge and experience of the grant-making enterprise. Dr Janet Yother of the University of Alabama at Birmingham presented 'Teaching medical and doctoral level students'. She discussed what universities look for in new junior faculty members including a good record of publications, not just in terms of numbers but also publications in quality journals. They also look for evidence of success at the level of your training and if you have the foundations for a successful research program, possibly including a grant proposal for submission. Dr Yother also described the other duties of the position. These included scholarly activities including conference presentations and the writing of reviews and book chapters and service to the department in the form of committee membership. She also provided a list of 'all the things you will be' including a scientist, teacher, mentor, writer and educator plus a committee member, a personnel manager, a mediator and psychologist and therapist!

She finished the presentation with a description of the career path of assistant to associate and then tenured professor and listed some of the attributes you will need to assemble on the journey through the tenure process.

Dr Mary Ann Courtney introduced the afternoon session with an overview of successful communications and presentation techniques. The final session in the afternoon presented by Dr Berniece Madison of the Centers for Disease Control and Prevention (CDC) described opportunities in Public Health and Clinical Microbiology. Following dinner we began utilizing Mary Ann's communications and presentation techniques in the evening workshop session where we finely tuned our PowerPoint slides for presentation to the other participants and faculty the following day. I found the workshop session very useful and made extensive changes to my slides in conjunction with most welcomed advice from faculty members.

Monday morning started with Bob Kadner describing the development of goals, objectives and a project plan for grant proposals. He emphasized the importance of having 'fundable' research interests, identified by the priorities of the funding agency. The importance of collaboration between laboratories was also highlighted. Cross-disciplinary collaborations can be particularly effective for bringing further funding and leads to publications outside of your current field. The need for clear aims in the proposal where also discussed with aims having significance, scientific merit and innovation. Dr Janet Shagam currently working as an independent medical writer then described the opportunities available in medical and science writing. Opportunities in contract work, freelance and traditional-employment were discussed and we were surprised to learn that most science writers don't have a science background.

Following lunch, the workshop split into two groups and the first session of student presentations began. In these sessions we presented a 10-12 minute overview of our research work to the other participants and faculty. Following questions the other participants provided very direct critique of the presentation. These sessions were not for the faint hearted with all participants being very forthcoming. We were encouraged to be ruthless but also to provide useful criticism of each presentation, which the other students could learn from. Students rarely get the chance to be critiqued in such a ruthless but helpful manner and I would encourage people to arrange study groups at their institutions to repeat this exercise.

The final presentation of the afternoon was 'The ethics of Grantmanship' by Dr Dennis Mangan, a program director at the NIH institute of Dental and Craniofacial Research. He described the role of the program director in identifying the 'good' science and the 'good' scientists in the program area.

Dr Mangan's inside perspective of the grant review process was followed the next morning by descriptions of teaching experiences at different types of institutions. Dr Michael Winfrey of University of Wisconsin-LaCrosse began these presentations and described teaching undergraduates at a state-sponsored non-doctoral campus. Dr Goldie Byrd from North Carolina Central State University then outlined her experiences teaching undergraduates at a minority serving institution. She was followed by Janet Shagam who talked about teaching opportunities at community colleges. Bob Kadner then led a discussion on ethics in publications. This interactive discussion was very useful with many aspects of ethics in publications being discussed. It was also an opportunity for many of the students to discuss 'real' situations which they had been involved in or had occurred to others in their departments. These discussions continued over dinner and then Mary Ann Courtney led an interactive discussion on learning styles.

Bob Kadner began the sessions on Wednesday with further ethical issues. Case studies from the ASM publication Scientific Integrity by Francis Macrina, were used and were extremely useful for stimulating discussion. I would thoroughly recommend the book to be part of the library of any young microbiologist. The rest of the day was dedicated to discussing opportunities in industry and alternative careers including law. Dr Malcolm Winkler of Lilly Research Laboratories described the opportunities in a large-sized pharmaceutical company. He went on to talk about the differences in the working environment and cultures between academia and industry, in particular the cross-disciplinary nature of industrial research. Some of the advantages of industry include the ability to change research direction rapidly usually dictated by market needs and the possibility of working on diverse ranges of problems. Dr Randy Dimond (VP and chief of research) from Promega gave a very entertaining presentation describing the start-up of the company from when he joined it in 1978.

The final session of the day focussed on opportunities in law for scientists. Paulenne Chelf (Intellectual property manager, Wisconsin Alumni Research Foundation) described the role of patents and intellectual property rights in the sciences. Dr Mark Kassell a patent lawyer from Foley and Lardner described the role of patent lawyers in biotechnology and the opportunities for moving into law from a science background.

He specifically described the need for patent lawyers to have a broad understanding of science and biotechnology to allow them to write and understand patents in the biotechnology field. The move to patent law from a Ph.D. in microbiology requires a 3 year law degree followed by passing the patent law bar exam. No small task however the future financial benefits for a law career were great when compared to the average science job with starting salaries for new patent lawyers starting at around $130,000! We were given Wednesday night off so some of us took a walk down State street to sample some of the famous microbrewery pubs in Madison. Revived by the fermentation's of the Angelica Brewhouse we discussed career options and other aspects of life in microbiology late into the night.

Thursday morning was the time to 'trash' our own grant proposals. We previously arranged ourselves into groups of three and exchanged our hard-grafted grant proposals between ourselves and our faculty member of choice. We chose Bob Kadner, a hardened veteran of many study sections as our faculty member for the grant reviews. One of the three students then described the grant proposal and we took turns critiquing it for its significance, approach and innovation. The discussions were very frank and open as we 'laid waste' to each other's proposals and we described both the positive and negative aspects of them. We all found this process very rewarding and helped us to identify weak points in the grant and specific areas for improvement. This experience will be very beneficial in the future when we have to prepare the 'real thing' to establish ourselves as independent researchers and to find funding for our own research programs.

Balancing your career and personal life was presented the husband and wife team Jorge Escalente-Semerena and Dr Diana Downs both from the Department of Bacteriology, UW. They talked frankly about their careers and how they have managed to balance both career and personal lives whilst both pursing tenure at the university. Their presentation described their development as independent microbiologists in spite of the fact they both shared research interests in *Salmonella* vitamin metabolism with Diana working with vitamin B2 and Jorge working with vitamin B12. They emphasized that you must learn to compromise and that no one can do everything especially if you want to maintain a passion for the job and family. One of the most significant messages was 'after all it is just a job' and a job can wait but family can not. On Thursday night we retired to a room at the Memorial Union for a celebratory banquet where Bob Kadner presented all of the participants with an unexpected but highly appreciated certificate from the ASM. Following the dinner a few of us said our good byes to Madison with a few more fermentation's from The Great Dane brewhouse where we dissected and discussed what we had learned over the previous five days.

We all agreed that the ASM and in particular the faculty members should be praised most highly for the institute. It provided a wonderful atmosphere for learning and informal discussion. It is not often that you can ask very senior faculty members of universities why they chose particular career paths and hear them talk candidly about the mistakes and wrong decisions that they made along the way. All of the participants left the institute with a much broader appreciation of possible careers in microbiology and what alternative options other than academia can offer. I would strongly recommend the institute to any graduate student (Ph.D.) or post-doc who is preparing to follow a career path in microbiology. The 3rd institute is planned for next year, again in Madison.

Finally I would like to sincerely thank the society of Applied Microbiology for their very generous support to enable me to attend this workshop.

Andrew Sails Atlanta, USA

Further reading:

Further details about the ASM education programs and the summer institute can be found on the ASM websites at:
www.asmusa.org/edusrc/edu1.htm
www.asmusa.org/edusrc/edu52002.htm

IUMS - Paris - 2002. XIIth International Congress of Virology

27 July - 1 Aug. 2002

I would first like to thank the Society for funding my attendance at this conference. I was one of 5,000 delegates congregating in this joint meeting of the three divisions of the International Union of Microbiological Societies which took place at Le Palais des Congres de Paris.

The conference was divided into 3 disciplines, the Congress of Bacterial & Applied Microbiology, the Congress of Mycology and the Congress of Virology. Each congress had between 3 to 9 symposia per session unless a joint plenary was given which combined all 3 disciplines and involved talks from world-renowned scientists. One particular lecture which captured my attention during the plenary sessions was given by the Arima Award winner for Applied Microbiology, Dr. Rino Rappuoli (Chiron Spa in Sienna, Italy), whose work had focussed on the development of bacterial vaccines and proposed an ingenious approach by using genome based tools (such as genomics, proteomics, microarrays etc.), whereby the sequence of bacterial genomes could be used for *in silico* predictions otherwise known as "reverse vaccinology".

Almost 2,000 posters were displayed, 49% of which were virology based and 45% bacteriology based. My poster presentation was part of the applied and environmental phage biology session and it outlined "***isolation of campylobacter bacteriophage with their corresponding hosts from broiler chickens".***

My major interests during the conference were the talks presenting work on bacteriophage genomes and applied and environmental phage biology. At an existence of 1030, tailed phage are undoubtedly the major entities present on earth, yet there is still much to learn about these organisms. A study presented by Richard Hendrix (University of Pittsburgh, USA) determined the genome sequence of 25 tailed phage and found then to efficiently use their DNA with up to 90 % of the genomes encoding for protein and the remaining regions comprising of 'junk DNA' consisting of mosaic genes created by combinations of parts of genes found in other phage. Examination of DNA sequenced fragments

from phage isolated from environmental sources, showed that only 10% of the proteins encoded by these phage to have recognisable homologues in the current databases.

The session of applied and environmental phage biology started with a talk by Betty Kutter (Evergreen State College, USA) on phage biology and how T-even phage infection occurs under more real-world conditions such as stationary phase and anaerobic respiration and fermentation. Her study showed major differences involving phage and host genetics as well as environmental parameters and there were many variations in infection patterns, with lysis inhibition times as long as 27 hours. These variations in infection patterns may help explain how these phage coexist so effectively and ubiquitously with their hosts in nature. Their consideration may be important in planning and evaluating therapeutic applications.

The second half of the session focused on the applications of phage, in particular, their use as bio-control agents of infectious organisms, also known as phage therapy. Studies began in the early 1900s by d'Hérelle, one of its discoverers. Unfortunately interests in phage therapy tapered off by the 1940s due to the antibiotic revolution. However as antibiotic resistant organisms have steadily been evolving, scientists in the Western World have once again sparked interest in using phage to tackle the fight against problematic organisms like vancomycin resistant enterococci, and MRSA.

There has been particular interest in using phage as bio-controls in livestock by research institutes and industrial companies alike in order to combat the battle against food poisoning organisms like *Salmonella*, *Campylobacter*, *E. coli* O157 and *Listeria*, of which the UK leads the research within this field. A spokesman for a biotech company, Alexander Sulakvelidze (Intralytix, USA) presented a talk on how they were developing ways of applying *Salmonella*-specific lytic phage as an additional tool for ensuring the safety of poultry food products. Their experiments showed that by spraying a "phage cocktail" ($2x10^8$ pfu/ml), the levels of *Salmonella* in experimentally contaminated eggs was reduced by approximately 3 logs. Furthermore, spraying the phage preparation on experimentally contaminated chicken carcasses reduced the number of *Salmonella* by 1,000 fold compared to carcases in the placebo group. This approach may prove to be a valuable tool in the *Salmonella* control program in the poultry and egg industries and its application commissioned at industrial levels within the next five years.

The bacteriophage group congregated at the end of the conference for a social dinner where I was lucky enough to once again converse in an informal setting with the likes of Betty Kutter and Hans Akermann, two outstanding researchers in the field of bacteriophage physiology, ecology sand genetics.

Catherine Loc-Carrillo,
University of Nottingham.

5th International Workshop on Pathogenesis and Host Responses in *Helicobacter* Infections,

Helsingor, Denmark, July 4 - 7 2002

Twenty years ago *Helicobacter pylori* was first discovered and found to be associated with gastric disease in its only host, humans. Since then there has been much interest in this bacterium and an increasing number of other *Helicobacter* species. There are still many gaps in our understanding of the pathogenicity of *Helicobacter* species and this meeting was an opportunity for scientists working specifically in this area to come together and discuss their research.

The workshop was organised by the European Study Group on Pathogenesis and Immunity in *Helicobacter* Infections, which was founded in 1992 with the intention of stimulating collaborations between groups working on *Helicobacter*. The first open meeting of the group was at LO-Skolen in Helsingor in 1994 and this has become the unofficial home of the meeting, with only one of the subsequent meetings being held elsewhere. The 2002 meeting attracted approximately 200 scientists from around the world. There was a large Scandinavian contingent, many groups from around Europe and some representatives from further afield, including the USA and South America. The venue of the workshop, LO-Skolen in Helsingor, is a purpose built meeting venue north of Copenhagen on the coast. The centre is self-contained with everything you could need, including saunas and a gym and excellent catering. We were lucky to have beautiful weather during the meeting and were able to enjoy views out to sea and of Helsinborg, Helsingor's twin town across the sea in Sweden.

The workshop was opened with an introduction from Leif Andersen, a member of the organising committee. This was followed by two introductory presentations covering genomics and proteomics. Sebastian Suerbaum (Wurtzburg, Germany) discussed the comparison of the *Helicobacter hepaticus*, *Helicobacter pylori* and *Campylobacter jejuni* genomes. *H. pylori* and *H. hepaticus* have both been linked to cancer in humans and comparing their sequenced genomes is a useful approach to identifying cancer-associated genes. Initial results have revealed similarities and differences between the three organisms, providing a starting point for further investigation. Sean Hynes (Lund, Sweden) then gave us an insight into several methods being used to study the *H. pylori* proteome, including a new Protein Chip®. This has several applications, including the analysis of proteins in response to factors associated with the host environment.

The majority of the rest of the meeting was organised into three parts: Genetics, Immunology and Pathogenesis, with poster sessions in the evenings and talks during the day. My poster was in the second session of the Genetics programme. There were roughly 20 posters in each session and this small size allowed all those presenting posters to give a short oral presentation on their poster during the session. This was quite a

daunting thought as it was a bit unexpected but it provided an opportunity to talk about my work to an audience and also stimulated discussion amongst the groups attending each session.

The Genetics talks covered a range of topics from detailed studies of individual genes to whole genome analysis. Thomas Meyer (Berlin, Germany) started off the presentations with a discussion on the progression of genetics and cell biology to vaccine development. This was followed by talks covering the genetic stability of *Helicobacter pylori*, genetic analyses of several virulence-associated *Helicobacter* genes and the use of techniques that have not previously been applied to the study of *Helicobacter* species. Holger Kavermann (Munich, Germany) talked about an adaptation of signature-tagged mutagenesis (STM) to identify genes essential for host colonisation. This technique has led to the identification of genes already know to be important for *Helicobacter* colonisation, validating the approach, and has also revealed several other genes. These genes have been divided into 10 groups including those thought to be involved in protein degradation, motility, cell envelope synthesis and metabolic activity. The majority of the genes identified have no annotated function and are of interest for further investigation. Fabrice Angelini (Bordeaux, France) gave an introduction to the use of *In Vivo* Expression Technology (IVET) to identify virulence genes. This is still in the preliminary stages but should provide another approach to identifying genes essential for the pathogenicity of *Helicbacter pylori*. Overall the Genetics talks indicated that much research has followed the publication of the *Helicobacter* genomes and that much is being done to obtain a clear picture of the roles of genes important in the pathogenesis of *Helicobacter*.

In the Pathogenesis section of the meeting most aspects of the pathogeneic pathway of *Helicobacter pylori* were covered from mechanisms of adhesion to persistence to production of disease. Many issues were discussed, including the use of different animal models and cell lines in the study of *Helicobacter* pathogenesis, the role of *Helicobacter* in extra-gastric disease, such as atherosclerosis and parkinsonism and the roles of several virulence determinants. These talks showed that the mechanisms of *Helicobacter* pathogenesis are complex and involve a large array of factors, both bacterial and of the host. The Immunology talks also covered a range of issues and highlighted the complex nature of the host-bacterial interaction with regards to the host immune response to *Helicobacter pylori* and how it may contribute to pathogenesis.

The conference was closed with a summary and future perspectives session. All the talks and posters were reviewed and some of the interesting findings presented at the meeting were discussed. I found the entire meeting both enjoyable and educational. It was an excellent opportunity to find out more about different aspects of work going on in the *Helicobacter* field and also to present my work and get feedback from others. The size and general atmosphere of the group attending the meeting allowed for lots of informal and stimulating discussion and I left with lots of ideas and enthusiasm.

After the conference I had an opportunity to visit Copenhagen before returning home. We were lucky to have sunshine during the whole trip and could fully enjoy the Copenhagen atmosphere. The people were very friendly and the streets were crammed with a variety of performers from the jazz bands participating in the Copenhagen jazz festival to puppeteers, circus performers and lots more.

I had a very enjoyable and informative trip and would like to thank both FEMS, for their Young Scientist Grant, and the **Society for Applied Microbiology** for the President's Fund Grant.

Rebecca Langdon,
University of Manchester

26th IDF World Dairy Congress
24 - 27 September 2002 Paris, France

Grants from the President's Fund plus the FOSS prize for Dairy Science enabled me to attend this Congress which has broadened my knowledge of dairy science and microbiology. The Congress was held at the Palais des Congres where the excellent conference facilities were provided. This Congress was inaugurated by Jean-Pierre Raffarin, the French Prime Minister, and delegates were welcomed by Jean-Michel Lemetayer, the President of Congrilait 2002.

There were over 500 delegates attending this Congress from more than thirty countries. The Congress was divided into seven conferences: *"Milk Production, Science and Technology, Dairy Policies and Economics, Dairy Products, Nutrition and Health, New Trends in Dairy Products Consumption, Communication: new socio-cultural expectations and global retailing; new Challenges"* and six symposia: *"Consequences of the Internationalization of Dairy Companies, Food, Body and Health: a cross-cultural Approach, yoghurt & fermented milk; benefits of live Cultures, Food Safety, Tracers & Sensors and protection of designation of origin and geographical indication"*. As a complement to the programme of conferences and symposia, more than 500 posters were presented in particular areas.

During the four days of Congress, milk bars offered free tasting of all categories of dairy products such as yoghurt, portions of cheese, milky desserts, milk of all colours and mini cheese sandwiches. A Cybercafe also placed Internet stations where we could consult our e-mails. In addition, the Congress offered four "Workshops on the taste of cheeses": varieties of milk, micro-organisms, cheese-making processes and time management to discover the rich range of tastes and textures of French cheeses. As a participant, the meeting gave me a very good opportunity to share and exchange knowledge with researchers who work in similar fields to mine.

Finally, I would like to thank the ***Society for Applied Microbiology*** for awarding me a grant from the President's Fund that enabled me to attend this useful Congress.

Pariyaporn Itsaranuwat
The University of Reading

Microbial Life (2002)

By Jerome J. Perry, James T. Staley and Stephen LorySinauer Associates, Publishers. pp. 811 + xxxi
ISBN 0-87893-675-0£35.99
reviewed by Jonathan Caddick

A NEW ARRIVAL to the field of undergraduate microbiology text books, Microbial Life focuses predominantly on, "the microbe itself rather than the diseases that might be caused by microorganisms" To accompany the book there is a student CDrom, which is compatible with both Windows and the Mac.

The book is divided into 8 parts, which are further subdivided into individual chapters. The text moves logically from the origins of life on Earth, through to an historical overview of microbiology and onwards past chapters on the chemistry of the cell, microbial physiology and metabolism, genetics and diversity. Although this book states it does not focus on disease aspects of microorganisms there are chapters on virology, immunology, and medical microbiology, which do cover these topics in depth. The CD-ROM included with this book is designed as an accompaniment to each chapter. The user can work through chapters in a specific order or skip them to suit their individual learning requirements. The CD offers additional information, not included in the text, which is well presented in the form of narrated animations on practical experimental procedures. This affords the user a more, "multimedia" experience, which in this case and in my opinion does aid the learning process. This book is not intimidating but inviting. Illustrations and photographs are well positioned and annotated and are both bold and colourful. Specific topics are well indexed, with the most relevant pages being distinguished with bold type or clustered page numbers.

Although the overall presentation of this book is of a very high standard there are a number of points on which I feel this book falls down. I found that while reading certain topics in this book the language used was accessible to begin with but would then jump to incorporate words that would be unfamiliar to most undergraduates. To exacerbate this problem many of these terms were not explained. Students would be expected to look up the meaning of these words but instead of this being an aid to learning I feel it is more of a hindrance and breaks up the overall flow of the text. Occasionally, I felt that when I read about a specific area some of the information I would expect to find about the topic would not be there. For instance, while relating the story of Alexander Fleming and the discovery of antibiotics, there is no mention of Florey and Chain and their contribution to the research that followed Fleming's original observations. I believe the absence of such information leaves an incomplete story for the reader. As a result I would be concerned if students used this book as a first line of reference.

Anyone reading this review should not go away thinking that Microbial Life is not of any use to them. This is on the whole a good book. A book I would certainly hope to find in any university library mainly because of its presentation of a broad subject without a focus on disease. However, I would not recommend Microbial Life as an all encompassing, "one stop", textbook for undergraduates studying general topics in microbiology.

Enclycopedia of Environmental Microbiology

(2002)Editor-in-Chief: Gabriel Britton pp. 3527 in six volumes ISBN 0-471-35450-3 £1300 Chichester: Wiley
reviewed by Max Sussman

MICROBIOLOGISTS have long been aware that the countless microbes they study are to be found in the environment. Some thirty years ago this knowledge began to be recognised as the science that became known as environmental microbiology. In truth, the basis of the 'new' science was and remains the basis of microbiology generally. 'The environment' is defined as "the totality of the physical conditions on earth or a part of it, especially as affected by human activity" *(Concise Oxford Dictionary of Current English).* What then is environmental microbiology? I suppose that it is the same totality "as affected by microbial activity". But definitions, especially of global notions, are strangely limiting. To find out what environmental microbiology is about, one can do no better than to peruse the pages of these six volumes. The nature and extent of the material presented is remarkable. In a way, it is also intimidating to realise the extent to which microbes affect the world around us, not least because the sample entry comes with the publishers press release is about 'bioterrorism'.

Each entry in the encyclopaedia is in fact a conventional review of its subject with a substantial bibliography. The topics covered range from methodological principles (e.g. screening methods for biosurfactants; membrane filter procedure for heterotrophs; ultraviolet disinfection) to detailed accounts of individual microbial entities (e.g. calciviruses; *Legionella*) and to environment-related diseases (e.g. cholera; leptospirosis), and much more. Wetlands are considered under 'flooded soils', while an entry under 'wetlands and reed beds' (sic) is devoted to a mode of wastewater treatment.

Finding ones way round the encyclopaedia is made reasonably straightforward by the comprehensive more than 100-page index in volume 6 and cross-reference headings placed between the substantive chapters. The reader should, however, be warned that complete reliance on the index may lead to a dead end. For example, there is no index entry for 'water activity' but this does appear as a cross-reference heading on page 3353.

Throughout, there are many excellent black and white illustrations, a few of which are reproduced again in the colour section of each volume. Some illustrations, particularly electron micrographs, are difficult to interpret because of poor contrast. Many important diagrams, for example Figure 4 (page 1444), are far too small and compressed for convenient use and the colour reproduction of illustrations is even smaller.

The Editor-in-Chief, Gabriel Bitton, was assisted in his monumental effort by a 16-person, predominantly USA editorial board. It is indeed impressive that, judging by the year of publication (2002) and literature reference up to 2000, these volumes went through the press in about two years. These volumes are, therefore, very up to date.

The description 'comprehensive' is often a term of praise in book reviews; here it should be seen as a term of excellence. It also means that these volumes should and will be used by many 'fundamentalists', who do not regard themselves as 'environmentalists'. They will find many entries of great value because

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Fungi in Bioremediation *G.M. Hadd.*

Biofilms: the Good, the Bad and the Ugly *Julian Wimpenny, Peter Gilbert, Jimmy Walker, Melanie Brading and Roger Bayston.*

Dictyostelium Evolution, Cell Biology, and the Development of Multicellularity *Richard H. Kessin*

Biofilm Community Interactions: Chance or Necessity? *Peter Gilbert, David Allison, Melanie Brading, Joanna Verran and Jimmy Walker.*

Salmonella A Practical Approach to the Organism and its Control in Foods *Chris Bell and Alec Kyriakides.*

Industrial Microbiology: an Introduction *Michael J. Waites, Neil L. Morgan, John S. Rockey and Gary Higton.*

Principles and Practice of Clinical Parasitology *Stephen H. Gillespie and Richard D. Person.*

they deal with important basic principles of wide applicability. At about £216 per volume, this book will hardly find its way into individual private working libraries. Once seen, however, many readers will surely use their powers of persuasion to make sure that they have access to a conveniently placed copy in their institutional library, where these volumes will undoubtedly be intensively used.

Transport of molecules across microbial membranes

Society for General Microbiology Symposium 58 Edited by J.K. Broome-Smith, S. Baumberg, C.J. Stirling and F.B. Ward Cambridge University Press
reviewed by Anna McElhatton

THIS BOOK contains the proceedings of the Society for General Microbiology fifty-eighth Symposium held at the University of Leeds in September 1999 and has been published for SGM the by Cambridge University Press.

There are few books that solely deal with the transport of molecules across microbial membranes. The issues tackled in this collection are certainly questions that most researchers have thought of or about during their observations on other aspects of microbiology. This discipline deals with highly variable situations caused by live organisms whose membranes carry out complex processes. The processes are difficult to compartmentalize and similarly, targeting a specific audience for this collection of valuable information is extremely difficult.

It certainly has current research as a point of reference; hence all those presently working on or interested in various facets of microbiology may find use for the body of knowledge that this publication has to offer. For those people whose area of interest is specifically transport across membranes, this book would certainly be a must read. It would also certainly be a good reference of current opinion for those, whose area of interest hovers near and who need accessible up-to-date information regarding transport across membranes.

The reader, however, must be aware that this is not a graduate or postgraduate textbook and must not be read as or considered as such. It is a collection of highly referenced and tightly written papers which convey aspects of current knowledge. The content is comprehensive and therefore requires some effort from the reader. It is after all the proceedings of a Symposium. The layout is formal and the diagrams are monochrome and functional. The emphasis is on content and utilitarian presentation rather than image.

Thirty-five contributors, well known in this area of research, have contributed to this publication. The editors have striven to edit this body of knowledge in such a way as to lead the reader through from a general overview to increasingly specific cell processes. Current fundamental principles were discussed in the overview by Broome-Smith and Mitsopoulos. The opening statement read as follows *"Our understanding of how molecules are transported across microbial membranes has lagged far behind our understanding of the processes that occur within the aqueous compartments of these cells"*. This statement alone argues the need for this and other such publications in this area of expertise, to help clarify queries as fundamental as *"how do large hydrophilic molecules pass through hydrophobic membranes?"*.

The reader is initially led through current knowledge regarding membrane proteins and includes suggestions regarding the need for further work on protein structure elucidation to further clarify current debate. The reader is gradually introduced to more specific and current areas of interest and intrigue ranging from multidrug resistance to virulence attributes and finally to the realms of genomics.

Other contributors to the symposium were specifically concerned with translocation of polypeptides across microbial membranes. There is no specific chapter that solely deals with this process but it is significantly implied if not mentioned in several chapters. Other chapters dealt with topics as varied as heavy metal (arsenic) transport and peroxisome biogenesis.

In conclusion, this is not an "easy read". Nor is it a book to be used to learn the discipline from scratch. It is however, a worthy book for those actively involved in the research process and should form part of the book collections we should all have in our office libraries.

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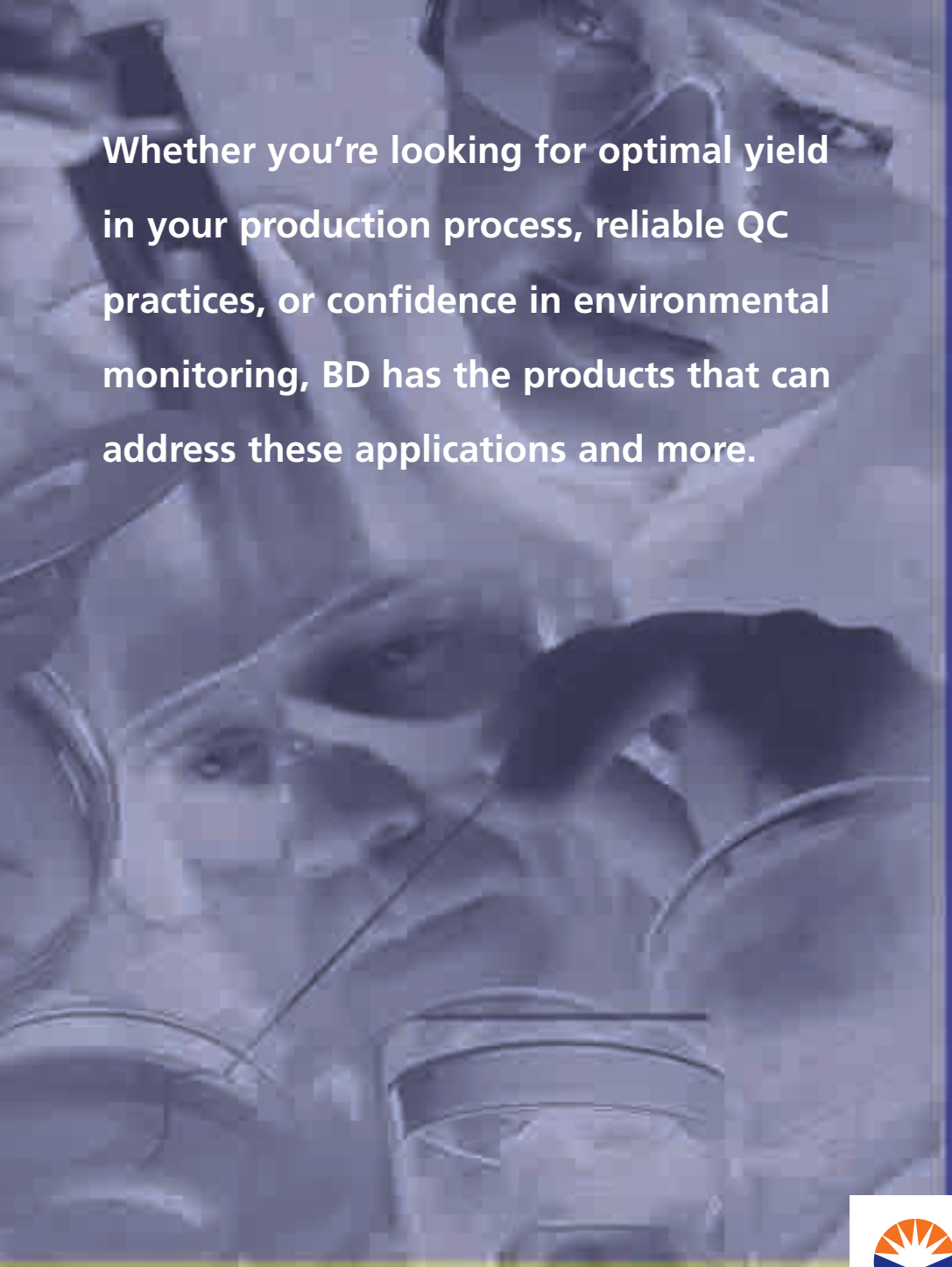

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