Microbiologist

The magazine of the Society for Applied Microbiology ■ June 2005 ■ Vol 6 No 2 ISSN 1479-2699

Let them eat dirt..

..but don't forget the hygiene

ALSO IN THIS ISSUE:

- Summer Conference 2005
- The secret life of an article
- Statistics for Biologists
- 75th Anniversary competition
- The benefits of scientific integration

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

www.sfam.org.uk

Editorial

IF ANY OF YOU HAVE BEEN keeping abreast of the news recently, you may have come across a story about another magazine whose title shall remain nameless.

The reason this publication hit the headlines' was that it chose to give away agar plates and encouraged purchasers to swab anything they chose and to grow up the resulting bacteria. I expect some of you may also know that our honorary general secretary has commented to the media about this story, describing it as irresponsible and dangerous in nature. Other scientists I know have also been approached by the media about a number of topical issues and I'm glad to say are mainly quite happy to talk to a group of people who are no longer seen as 'the enemy'. Perhaps they are taking heed from the previous issue of *Microbiologist*?

In this issue of the magazine, Professor Sally Bloomfield debates the facts behind the 'hygiene hypothesis' (page 26). Having just moved home I am well aware of the necessities of cleaning. How some landlords manage to find tenants for their properties is beyond me. Some places I've seen were a sight to behold! Professor Bloomfield discusses the use of the word 'hygiene' in the hygiene hypothesis and asks: has the general public grasped the message behind the phrase 'Let them eat dirt' a little too literally? Are some people using it as a reason to be lazy with their home hygiene? Judging by some of the properties I've seen recently, I'd have to say in some cases, 'yes'.

The December issue of *Microbiologist* carried an article about the use of ANOVA (page 18) which was incredibly popular. I was very pleased with the number of our members who wrote in singing its praises. As a result we are beginning a regular column on statistics with examples which are particularly relevant to microbiology. Each issue will concentrate on a different statistical test and this issue sees Richard Armstrong and our own Dr Anthony Hilton discussing data analysis and the assessment of data set distribution (see page 34). You may be forgiven for thinking this is an agony aunt column, when they ask - is this normal?

If you've ever wondered what happens to a journal article once it has been reviewed and accepted for publication, we have an article which will answer all your questions. The journey your articles go through, quite literally, before they reach the library shelves is quite incredible and I'm sure you'll be as fascinated to find out about the publication process as I was (page 30). As a follow-up to this article we will be answering all your questions about copyright issues. Please send in your questions to me at: **lvharper@dialstart.net** and Sue Mattingley, from Blackwell publishing, will endeavour to answer your questions.

Finally, you may be aware that next year is the 75th anniversary for SfAM and we would like to involve you, the members as much as possible in commemorating this great event. In this issue of *Microbiologist* I will be launching a competition to find the most significant microbiological breakthrough of the last 75 years (page 10). Write to me with your opinions, thoughts or memories — from the famous to the not-so-well-known; from the significant-to-mankind to the most personally significant, as long as your recollections are microbiological in nature and occurred in the last 75 years we want to here about them. Send your entries to me and you could be in with a chance of winning a bottle of champagne.

society for applied sfam microbiology

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Microbiological Consultancy

The SfAM Microbiological Consultancy Service allows full Society members to advertise their microbiological skills or services on the website for a small annual fee of £25.00. Your advert will be shown on our Consultancy list for 12 months, after which you can either renew your subscription or leave the scheme.

Job opportunities

Whether you're just starting your career, looking for undergraduate work experience, new opportunities, or an employer seeking to fill a vacancy, Jobs@sfam is the place to find work and advertise your vacancies! With over 70 unique Visitors to the site every day this completely FREE service is a great way to put your vacancy or CV on the desktops of microbiologists around the world.
Full Members can view and apply for jobs; advertise vacancies, upload their own CV's and view the CV's of other members as well as applying to employ undergraduate students through our popular **Students into Work Scheme**.

For more information on these member services visit the website at sfam.org.uk or contact the Society Office on 01234 326661

SfAM WEBSITE www.sfam.org.uk

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

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

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

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

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

Coming soon – online booking for the Summer Conference in Brighton (Spore-forming bacteria – emerging and re-emerging issues).

March 2005 Spot the difference answers

Congratulations to **Lisa, Joanne, Charlotte** and **Val** (sorry - none of you provided your surnames) from Preston, Lancashire, who correctly spotted all ten differences. You can all share (or fight over) your prize of a £30 book token.

Word Puzzle

This issue sees the return of the microbiology crossword. Those of you who've been keeping an eye on the news will easily be able to solve the puzzle below. Just re-arrange the boxes to form a sentence about a dangerous choice of 'free gift' chosen by a particular publication recently. Complete the puzzle correctly and you could be in with a chance of winning a £30 book token.

The sentence is:

_____

_____

_____

_____

_____

F R E	A U S
A T E	_ C A
_ C H	G A R
N _ C	O R _
T I O	G G R
S _ F	O O L
R E N	E _ A
E _ A	I L D
A V A	_ P L
S C H	N

A £30 book token is waiting for the person whose entry we receive first! The closing date for entries is **Friday 17th June 2005**. The answers will appear in the September 2005 issue of ***Microbiologist***.

Name: _____

Address: _____

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

New Members

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

Brazil

Mrs C R V Batista

Denmark

Dr P Dalgaard

France

Dr P Sylvestre

Greece

Dr K Koutsoumanis; Dr P Skandamis; Dr A Stamatiou

India

Mr V J R Kumar; Mr A Singh

Ireland

Ms E Black; Ms S L Hamill; Miss D C Rooney; Ms H Walsh

Italy

Mrs Stefania Quintavalla

Japan

Mr B Mahmoud

New Zealand

Dr R O Doehring

Nigeria

Mr S A Adebusoye; Mrs S B Balogun

Syria

Dr N M Daood

Thailand

Dr P Itsaranuwat

United Kingdom

Dr P Aldridge; Mr N N Amuna; Mr C A Beynnon; Mr A Butcher; Mr J Cass; Dr I R Cooper; Ms E Edet; Mr T Edge; Dr H Garelick; Mr G D Healey; Mrs C M Holcroft; Mr D Knox; Dr T K Ralebitso-Senior; Miss V Sherwood; Dr M M Tunney; Miss C Vipond; Mr Thomas L Williams

USA

Professor W Kirby-Smith; Dr R Narasimhan; Professor F Rainey; Dr M Sanchez-Plata; Dr E Scott; Professor J Tor

Dr Peter Silley explains the importance of Applied Microbiology having a lobbying voice within the political sphere

I guess that is a piece that is probably the most difficult of all to write, the last one as President of the Society. So much has been achieved by a great Committee and yet there is still so much to do. At the 2002 President's Dinner - the first one of my reign — I set out something of a vision as to where I believed the Society should be heading, so how well have we done and how much has been achieved? As I introduced our Guest of Honour, Professor Brian Duerden I made the point that it was important that the Society became involved with the decision makers that influence the direction of microbiology in this country. I was pleased to report that Committee had decided that a major focus of activity over the coming years was to raise our profile within the public debate on science policy in the UK. I clearly stated that as a Society I did not believe that we had worked hard enough to foster links with the decision makers. There was clearly much to be done and my hope was that this Society would be increasingly heard as a relevant authoritative voice, the voice of applied microbiology. It was and remains my view that in many cases this will mean working with others to proclaim a united voice whilst retaining our distinctiveness and I stated that we cannot afford to turn our backs on our natural partners but that we should look to be the builders of bridges rather than those more interested in destroying them.

I am aware that there is still much to do, however, I think we have done pretty well and I hope that you share those thoughts, although I could well understand that you might feel unaware of what has been happening. We are conscious that we have not communicated as well as we could with members and to this end we have created a new temporary position which we hope will properly address many of these communication problems.

SfAM is going through an exciting period as, in addition to the normal activities of a learned society, we are exploring how to develop additional value for our members and the wider science community. It is particularly exciting to be responsible for all the internal and external communication aspects of the EU "Network of Excellence" on zoonotic diseases - Med-Vet-Net. This network brings together over 300 scientists in 10 countries and 16 Institutes and the society's contribution is fully funded by the EU. Med-Vet-Net has already formed links with American and Australian groups and I look forward to the Society becoming increasingly involved in the world of science communication.

Another activity we are also concerned with is the development of the science base, in particular, the need to ensure adequate funding for the teaching of applied microbiology in our Universities as we are all aware, the practical aspects of applied microbiology, though essential, are expensive to teach. We are having some excellent dialogue with government on this subject. Our membership of the Biosciences Federation is important in these activities and as an active member of the federation I believe we are in a strong position to reflect the voice of applied microbiology.

There have been far too many initiatives undertaken over the last three years to reflect on each in turn and indeed this is not the place to do so. It is, however, the place to say a big thank you to all those who have supported me and indeed challenged me, on what has been an incredibly enjoyable journey. When asked, "Are you looking forward to July?" I can honestly reply, "Yes" as I will be appreciative of the extra time that I will have but I will really miss the opportunities to work for and to represent SfAM, whether it be with Government, Biosciences Federation, Industry, FEMS or Blackwells . It has been a real privilege to serve the Society in this way and I want to say a big thank you to all those who put their trust in my leadership, I hope that I have not let you down. I also want to say a big thank you to Don Whitley Scientific, never once in the last three years has anyone

complained at the time that I have spent away from the company whilst on SfAM business. Committee have been aware that we cannot continue to expect employers to behave in such a way and I am delighted that we now have a Chief Executive Officer (CEO) in place (see page 11) to work with the Officers, as SfAM continues to move forward representing the voice of applied microbiology. I also want to say a big welcome to the new incoming President, Dr Margaret Patterson. I have known Margaret for more years than I care to remember and have worked with her on SfAM business and I can be confident that the Society is in good hands, I trust that you will support her as well as you have supported me.

Peter Silley

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

For more information about the benefits and costs of advertising your products or services in *Microbiologist* please contact Julie Wright at the Society Office or visit:
www.sfam.org.uk/pubs/microadvert.html

Did you know you can apply to join the Society online?

To join the Society, or for more information about the benefits of joining the UK's oldest microbiological society, visit the following page on the Society website:
www.sfam.org.uk/join.html

Could YOU benefit?

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

www.sfam.org.uk

Am I eligible - can I apply?

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

GUIDELINES

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

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

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

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

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

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

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

Marathon Man Romps home!

Congratulations go to **Keith Jones** who successfully completed the **London Marathon.** He says of his efforts: "I was on schedule for around four hours after fourteen miles but got hot and took the decision to enjoy the last mile or two and slowed down for the next ten. This meant that I could run reasonably fast when the family were watching. The downside was that I was overtaken by inumerable men dressed as women, a rhinocerous, a taxi, tigger, a teddy bear and three firemen in a wooden fire engine. It is a good example of age related decline (from three hours forty minutes in 1994 to five hours three minutes in 2005).

Thank you to those who agreed to sponsor me on behalf of WaterAid (and anyone else who feels the need)."

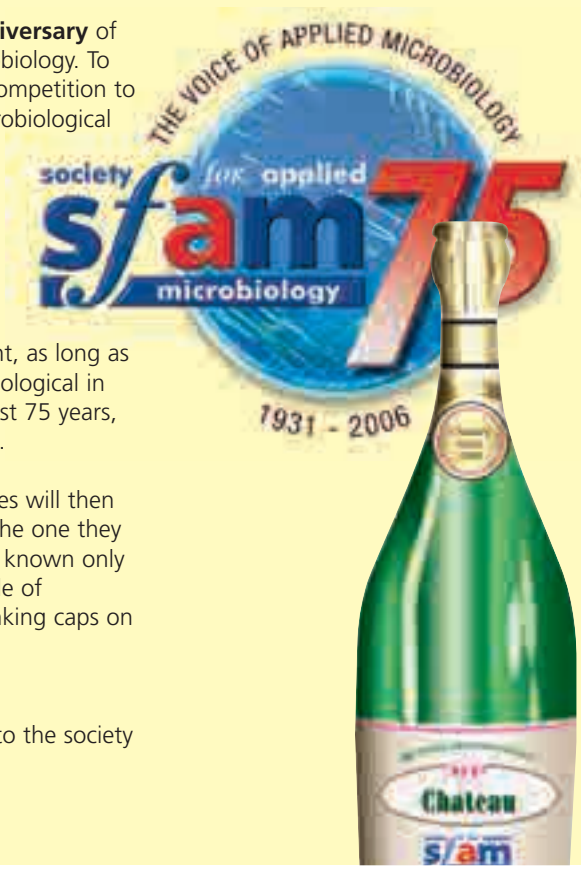
Keith Jones

75th Anniversary Competition

Next year sees the **75th Anniversary** of the Society for Applied Microbiology. To celebrate we are running a competition to find the most significant microbiological event or breakthrough of the last 75 years. Write to me with your opinions, thoughts or memories — from the famous to the not-so-well-known; from the significant-to-mankind to the most personally significant, as long as your recollections are microbiological in nature and occurred in the last 75 years, we want to here about them.

A panel of independent judges will then sift through our entries and the one they consider the best for reasons known only to themselves will win a bottle of champagne! So get your thinking caps on and write in to me at:

lvharper@dialstart.net
or send your entries by post to the society office.



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Benefits

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

New Chief Executive Officer

HELLO FROM YOUR NEW Chief Executive Officer (CEO). I am writing this at the end of my first month in post. It has been a very steep learning curve trying to begin understanding all the processes that make the Society function. This month has also been a period of meeting new people and developing working relationships.

To give you an idea of who I am and where I have previously worked, I detail below my career details to date.

I have joined SfAM from Mast Laboratories (a company manufacturing and supplying products used in microbiology laboratories) where I worked for ten years. I was Managing Director for Mast Laboratories and this involved Directing both the manufacturing and laboratory (quality control and product development) functions of the company. During my time at Mast I was fortunate enough to also study for a Master of Business Administration degree at Sheffield Business School, Sheffield Hallam University.

Before being asked to join Mast I was the Laboratory Manager in the microbiology laboratory at the Royal Hallamshire Hospital, Sheffield. I was involved for many years in teaching and education, in particular for the Biomedical Scientist profession. I taught and organised the microbiology modules for Fellowship of Institute of Biomedical Science and Master degree levels. In addition to teaching commitments I have also been involved for numerous years with organising the 'Microbe' series of conferences. I was involved for ten years on the Scientific Advisory Panel for the Institute of Biomedical Science, this included the last four years as Specialist Advisor. In addition, during my stay in Sheffield I obtained a Master in Medical Science degree obtained by thesis from the University of Sheffield. I have over sixty scientific publications to my name and have attended numerous national and international symposia.

I join the Society at a very exciting time in its history. The Society celebrates its 75th anniversary next year and already there are plans in place to make this a special celebratory year.

The Society is playing a pivotal role in the Med-Vet-Net programme and is the Communication centre for this EU funded initiative for Zoonotic Diseases.

The Society is also becoming more active in lobbying and canvassing for the interests of its members. This involves collaboration with other learned societies and meeting with Members of Parliament and representatives of Government ministries, so that the voice of applied microbiology is heard at the highest levels. I will, over the coming months, be involved with all these initiatives which are underway and I am sure all of them will develop and prosper.

My role as CEO involves both operational and strategic management. Operationally I must ensure that the administration of the Societies business is effectively and efficiently delivered. This involves making sure that the members expectations are met and if possible, exceeded. On a strategic level, I will be involved with the Trustees of the Society making sure policies which are set are implemented and delivered. These policies will shape and secure the future of the Society.

I would welcome any feedback from all SfAM members on any SfAM issue and I look forward to meeting you in Brighton at the Summer Conference.

Philip Wheat
pfwheat@sfam.org.uk

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If you feel you could be our next winner for 2005, and would like some promotional material to help you recruit new members please contact Julie Wright, Membership Co-ordinator on 01234 326661 or email julie@sfam.org.uk.

Guessing the future: a thing of the past?

Report on the January 2005 Meeting held on 13-14 January 2005 at the Dunston Hall Hotel, Norwich, UK

THE CONFERENCE THEME this year was on the subject of predictive microbiology and risk assessment. This was followed on the Friday by a ComBase workshop, organised by Jozsef Baranyi, Clare Aldus and colleagues, at the Institute of Food Research, which explored new developments in the Combase project.

Initial misgivings about the remote location of the hotel were soon dispelled. The accommodation was extremely comfortable, the food delicious and the conference facilities were very good, with consistent assistance provided by the hotel staff. The hotel also catered well for active relaxation in any spare moments during the conference, with a swimming pool and gym, while for those keen on outdoor exercise, there was a large golf course, the perimeter of which could be covered in a thirty minute run!

The programme contained some excellent papers, the first of which, by Leon Gorris, introduced the background and history of predictive microbiology and risk assessment. He explained how attempts to assure food safety were developed through use of HACCP, GMP and GHP. This approach has developed into a more risk-based and outcome-orientated approach, facilitated by developments in predictive microbiology (PM), which supports microbiological risk assessment (MRA) by helping to deal with complex situations requiring analysis by MRA.

József Baranyi introduced the ComBase database, explaining that it is a collection of data pertaining to microbial responses to the food environment. It encompasses data used in the former Food MicroModel and the US Predictive Modelling Program and is constantly being updated with new data. All data are subjected to stringent scrutiny to maintain quality. Combase is freely available via the internet and provides a valuable source of information for the food industry, academic teaching and research and regulatory authorities.

Carol Adair discussed use of expert systems in food safety, with reference to the extensive system used by Unilever. In such a large company it is essential that consistent and systematic procedures be followed for assessment of food safety. These are provided by a central facility with specific data and expertise in food microbiology, which can be accessed by regional centres throughout the world using the Unilever intranet.

Linda Everis described the procedures used by CCFRA in developing kinetic growth models for food spoilage microorganisms. Unlike the situation with foodborne pathogens, some growth of spoilage organisms can be tolerated provided it does not exceed a predetermined limit. Mixed genera models of spoilage organisms provide predictions that are as reliable as models developed using a single genus.

Ronnie Lambert apologised for keeping his mobile phone turned on during his presentation (the happy event took place a few days later; it was a girl!). Ronnie discussed the concepts of hurdle technology in the preservation of foods

and use of response surface models, but disputed the value of such models for quantifying interactions of preservative factors. The gamma hypothesis, where the factors are additive unless synergistic or antagonistic, may be an improvement, but problems remain over determination of synergy and how to add the inhibitory effects.

The final paper on the first day was presented by Marcel Zwietering who

provided the background for the second day by discussing the link between predictive or quantitative microbiology and quantitative risk assessment. He demonstrated that predictions by various models often do not differ greatly for the same conditions and the accuracy is sufficient for demonstration of food safety. Consequently, models can be valuable tools for use in HACCP and risk assessment.

The second day concentrated on MRA, with particular reference to practical applications. Alec Kyriakides referred to application of risk assessment in management of safety of retail foods. Controversially, he commented that industry found predictions from models too fail-safe to be of value. It is important for retailers to accept that risk exists and that it must be managed in an appropriate way.

Serve Notermans continued with discussion of risk characterisation and exposure assessment, in which he explained that MRA is a scientific way of assessing the health threats caused by hazardous agents in food. He demonstrated the probabilistic approach for determining exposure assessment, which fundamentally attempts to assess the number of microorganisms consumed with food. The outcome of risk assessments is often difficult to

communicate to those who must manage risk and future work will involve exploring ways of simplifying risk assessments.

Moving on to practical applications of MRA, Phil Voysey commented on the often unappreciated difference between risk assessment as a governmental and regulatory device and as carried out in the food industry. In the latter situation it is a tool to improve the value of HACCP.

He used three examples to demonstrate practical applications: growth of *Clostridium botulinum* in cooked, uncured, modified atmosphere-packed sliced chicken, salmonellae in milk powder and *Listeria monocytogenes* in salads (not yet complete).

Alan Varnam continued discussion of practical applications with comments on MRA associated with handling of shell eggs. Statistical analysis of experiments involving contamination of eggshells by salmonella revealed that it is not possible to state that eggs shells can ever be free of *Salmonella*. Salmonellae on the surface of eggs could be transferred to hands, other surfaces and to the contents of the egg on breaking. Consequently there is a small but finite risk to consumers associated with handling eggs.

Alan Godfree explained that application of MRA to drinking water was relatively new. Qualitative MRA for *Cryptosporidium* in water requires evaluation of factors including source of water, catchment area, treatment, and

evidence of waterborne cryptosporidiosis, followed by expert judgement of likelihood of that treated water will contain *Cryptosporidium* oocysts. Quantititative MRA has been used to assess risk in terms of food safety of use of treated sewage sludge on land for arable crop cultivation.

From the viewpoint of the Food Standards Agency, Paul Cook explained that there are three types of MRA: rapid MRA carried out in cases of immediate hazards and incidents, medium term MRA which takes into account findings of expert committees and finally, long term strategic MRA which are derived from funded research projects. International approaches to MRA are being developed through Codex.

The conference concluded with Peter McClure presenting a forward look at possible emerging issues likely to require MRA. As "new" agents of disease emerge, observation of demographics and geography is needed to make a complete assessment. Reasons for emergence of new pathogens were considered, including evolutionary changes in microorganisms, resulting in modulation of virulence traits and survival characteristics; changes in agricultural and food processing practices and changes in peoples' travel and eating habits.

The general standard of the presented papers was considered to be very good, there were nineteen posters and the conference overall was judged to be highly successful.

Jane P Sutherland

Research Funders get tough on Science

Alan Malcolm of The Institute of Biology reports on the importance of Quality Control in obtaining contracts and research grants from Funding bodies

IT HAD TO HAPPEN. Research Funders now need to be assured that the correct systems for quality monitoring are in place in laboratories, before they will sign contracts and award research grants.

There have been just too many occasions recently where the public has demanded to know how they can trust scientific results. Regrettably, peer review prior to publication is not sufficient for many 'experiments' of interest and relevance to the traveller on the Clapham ominibus.

The Bovine Spongiform Encephalopathy (BSE) cow/sheep brain mix up was the straw that broke the camels back (to mix a metaphor), but there have been court cases that collapsed because the scientific evidence was not robust enough, genetic tests recalled because of lack of confidence in the results, food scares such as plasticisers in baby foods that weren't, toxins in cockles that may not have been there after all, and pharmaceutical companies have been chastised for not revealing ALL their data gathered during the testing of potential new drugs.

The recent announcement regarding conditions for the award of research funding (grants, contracts etc) from The Biotechnology and Biological Sciences Research Council (BBSRC), Department for Environment Food and Rural Affairs (DEFRA), Natural Environment Research Council (NERC) and Food Standards Agency (FSA) include the following:

- managers have a responsibility to ensure a climate of good scientific practice
- project plans must be developed in collaboration with the funding body, including risk assessment
- the organisation must have processes in place to assure the quality of research
- all samples and experimental materials must be comprehensively labelled and tracked
- all research procedures and methods must be documented

- the project leader must regularly review the records of each scientist

Individually, some of the above are not too onerous and are undoubtedly already in place in most universities, but collectively they have the potential to increase bureaucracy considerably and place pressure on the project leader.

The funders maintain that researchers have been given ample opportunity to air their grievances. The head of the UK Deans of Science Committee recently said that most universities were unaware of the code.

It is unlikely that many potential recipients of Research Funding Body largesse have viewed the news with delight.

We all know that "good laboratory practice", adherence to Health and Safety Executive (HSE) codes, etc., does not guarantee the absence of mistakes. However the climate of opinion has shifted such that the absence of such controls lays the research funder open to severe criticism should things go awry.

We therefore need to find a way forward that does not involve overworked scientists drowning in yet more (electronic) form filling.

There are two separate (and both probably essential) components to this.

The first involves systems for laboratory practices such as ISO 9000 and its congeners.

The second relates to the personnel rather than the methods. The usual approach to this (as used by the medical profession, lawyers, engineers and accountants) is a verifiable programme of Professional Development using leading to Chartered status (or inclusion on a central register). All worthy scientists are virtually certain to be doing this anyway. What is required is appropriate external validation with the lowest level of intrusion into the working life of the individual. Such a scheme needs to be flexible enough to meet the varying needs of biologists who work with dangerous pathogens (whether HIV, foot and mouth, or aspergillus), or who assay metabolites or who monitor cod populations, or who follow butterfly migration, or who teach (whether in school, higher or tertiary education) all of the results of such work.

The Institute of Biology (which was granted its Royal Charter more than 25 years ago) has been working with all these various aspects of the profession during the last few years to develop such a continuing personal and professional development (CPD) scheme. It has now been adopted by the Defence Science and Technology Laboratory (as its preferred scheme for its increasing number of biological scientists. Discussions with both DEFRA and the Department of Trade and Industry (DTI) are under way, and have been initiated with the FSA.

The programme was launched recently in the House of Lords, with warm support from the Ministers for Science and for Education.

Further Information

- **http://www.iob.org**

Alan D B Malcolm

BIOCHEMICAL JOURNAL Public Access Policy

1906–2006 Centenary

At the 111th annual meeting of the full Editorial Board of the *Biochemical Journal*, it was announced that papers accepted for publication in the *Biochemical Journal* will be deposited automatically in PubMed Central (PMC), the U.S. National Institutes of Health (NIH) free digital archive of biomedical and life sciences journal literature, six months after the publication date of the issue.

Authors will not have to expend additional time and effort on the deposition process themselves. The authentic, final copy-edited version of Authors' articles will be placed in PubMed Central without the need for further work from them. This significant benefit is in addition to the fast and thorough peer review, fast time from acceptance to publication and high visibility of the *Biochemical Journal*.

Professor George Banting (Bristol), Chairman of the Editorial Board, said "this policy will provide an additional and independent secure online archive for the Journal and serve to reinforce the Journal's role as a major vehicle in the global communication of science."

Rhonda Oliver, Managing Director of Portland Press Ltd, commented that "as the Journal looks forward to celebrating one hundred years of scientific excellence in 2006, this policy will strike a balance between the demands for greater public accessibility and providing the financial sustainability to secure the continuity of the scientific record for its next one hundred years."

Notes for editors:

1. Time for first decision approximately four weeks for full papers, approximately two weeks for Accelerated Publications.
2. Time from acceptance to publication approximately nine weeks online for full papers and approximately six weeks online for Accelerated Publications.
3. Accepted papers are published online as pdfs within five minutes of acceptance as Immediate Publications (IMPs).
4. IMPs are freely available to anyone with internet access anywhere in the world.
5. The Biochemical Journal (www.biochemj.org) will be celebrating its centenary in 2006.
6. The Biochemical Journal is published by Portland Press Limited (www.portlandpress.com), the wholly owned publishing subsidiary of the Biochemical Society. The publishing proceeds from the Journal are returned by gift-aid to the Biochemical Society (www.biochemistry.org) to enable it to carry out its mission to communicate biochemistry internationally.
7. PubMed Central (www.pubmedcentral.nih.gov).
8. For further information contact editorial@portlandpress.com

MED•VET•NET

Teresa Belcher reports on the benefits of scientific integration

MED-VET-NET IS A EUROPEAN Network of Excellence that aims to improve research on the prevention and control of zoonoses by integrating veterinary, medical and food science research. Comprising of 16 European partners and over 300 scientists, **Med-Vet-Net** will enable these scientists to share and enhance their knowledge and skills, and develop collaborative research projects. **Med-Vet-Net** officially commenced on 1 September 2004, and is funded to the value of €14.4 million for 5 years.

Creating critical mass of knowledge and experience

Med-Vet-Net's partner institutes comprise an extremely wide range of expertise. By pooling the scientific expertise of all institutes, critical masses of knowledge and experience will be generated to provide advice and research capability. At the same time, this will release resources to expand expertise, provide opportunities for training and personal development and allow flexibility to respond to emergency situations, which will have both national and European-wide benefits. Additional benefits would be accrued from alleviating the workloads of some key scientists in Europe who are under constant demand for their level of expertise.

The impact of **Med-Vet-Net** will also extend far beyond the immediate network partners. By specifically aiming to develop and extend the external contacts of the network, by cataloguing, establishing and maintaining contact with scientists in other European and international institutes, small and medium enterprises (SMEs) and stakeholders, such as agro-industry bodies and consumer councils, there will be considerable opportunity to disseminate knowledge and exploit results throughout Europe and beyond.

The overall scientific impact of such a network structure will be the improved capacity to provide consultancy and advice to national Food Safety Agencies, other governmental bodies and non-governmental organisations (NGOs). An improved environment for scientists to work together will also contribute to the understanding of zoonotic agents and consequently the development of strategies for their prevention and control and, potentially, even a model system for stimulating integrated research in other areas.

Common collections and sharing of equipment

Med-Vet-Net is designed to be a durable structure. The personal contacts established by key scientists as a consequence of **Med-Vet-Net** will endure and continue to generate international research collaborations. In addition, the creation of common collections and databases, the shared use of equipment and technical platforms like standardised and harmonised operating procedures, the maintenance of electronic communication systems and training courses, will all contribute solid and sustainable links between scientists and institutes. Furthermore, the management structure, designed to mimic a "virtual institute", is envisioned to provide the model for any potential European Zoonoses Centre of the future. By extending and developing the network collaborations beyond the partners through new joint proposals and research projects a self-sustained structure will be established, able to obtain required future funding from national or European bodies.

Contribution to standards

There is an urgent need, throughout Europe, for harmonised and standardised protocols, such as for the detection and typing of zoonotic agents, and also tools, such as databases and reference strain sets. A significant and achievable contribution of **Med-Vet-Net** will be the development and delivery of standardised protocols and validated methods and tools relevant to zoonoses. The joint participation of public health and veterinary institutes, especially those with food safety responsibilities, will enable the introduction of common standards for use along the whole food chain to become a practical outcome of network activities.

The delivery of validated standard operating procedures (SOPs) for the detection, identification, typing and quantification of major food borne pathogens is an objective of several of the scientific workpackages. This will be complemented by the provision of databases and reference standards. Achievement of these objectives requires considerable integration between the public health and veterinary partners of **Med-Vet-Net.** The spreading of this excellence wider, especially to end-users in the food-industry will be achieved by the electronic publication of SOPs. Where possible, SOPs and similar documented procedures will be harmonised with other

European networks, and where possible, with US standards.

Contribution to policy developments

The majority of partners have responsibilities for provision of advice and consultancy to their respective national governments on aspects of human health risks, animal diseases and welfare, and food safety. Many key scientists will also provide advice and consultancy to international agencies making policy decisions, including the World Health Organisation (WHO), European Food Safety Authority (EFSA), Food and Agriculture Organisation (FAO) and World Organisation for Animal Health (OIE). For some institutes, these activities are encompassed in Reference Laboratory Facilities.

Risk assessment and related communication strategy

Risk assessment and risk communication, as components of Risk Research, are major functions of the **Med-Vet-Net** project. The network includes the foremost research groups working on risk assessment of zoonotic diseases in Europe. In particular groups from the Federal Institute for Risk Assessment (BfR) in Germany, the Veterinary Laboratory Agency (VLA) in the UK, the Danish Institute of Food and Veterinary Research (DVFV), the National Veterinary Institute (SSI) in Sweden and the National Institute for Public Health and the Environment (RIVM) in The Netherlands, have world-wide reputations in this field. The importance of risk research is recognised by the establishment of a specific Thematic Group, supported by an expert recruited from each partner.

Looking forward

Med-Vet-Net will consider all human, veterinary and food aspects of zoonotic diseases. To achieve this, collaborative expertise is available from doctors and medical scientists who identify human diseases, epidemiologists and risk analysts who establish links with animals, microbiologists who confirm those links and veterinary and food scientists responsible for the control and prevention of the risks.

Such a multi-disciplinary approach will enable knowledge to be shared across regional, national and international borders. **Med-Vet-Net** is already extending beyond Europe. Active collaboration has been established with a similar research network in Australia (AB-CRC) and further European funding has been awarded to support collaboration with the new food safety research network of CREES (Co-operative State Research, Education and Extension Service) and the USDA (United States Department of Agriculture) in the USA.

The future challenge will be to draw together all this research expertise into a global network to be linked together by the common goal of sharing knowledge to ensure human public health worldwide.

Further Information

■ For more information, visit our website at http://www.medvetnet.org/ or contact me at the SfAM offices in Bedford on:
+44 (0)1234 271020

Teresa Belcher
Med-Vet-Net Communications Director

VENUE:
The Old Ship Hotel

Dating back to 1559, The Old Ship is the oldest hotel in Brighton and stands proudly on the bustling seafront of this historical city. From its magnificent white façade to contemporary modern reception area, the hotel prides itself on its excellent customer service and comfortable, relaxed surroundings.

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Spore forming bacteria — emerging and re-emerging issues

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

The conference will consider recent advances in understanding in health, industrial and environmental issues associated with spore formers (following on from the 1994 meeting). It will review understanding of the taxonomy of spore formers and consider the physiological aspects, particularly those associatiated with spore structure and resistance. The health implications will be considered with respect to common infections caused by spore formers in both animals and man, the persistence of spores in food products, and also recent developments facilitating the use of spores as vaccine vehicles, probiotics and tumour targeting vectors. The environmental applications of spores will also be reviewed.

There will be sessions on:

- **Spore formers the great survivors — a taxonomy and physiology update**
- **Spore formers in food microbiology**
- **Spore formers: human health issues**
- **Environmental applications of spore formers**

There is also an opportunity for oral and poster presentations. Please see the panel on the right or visit the Society website at www.sfam.org.uk/sumconf.html

Programme

Monday 4th July

Drinks Reception

Lewis B Perry Memorial Lecture – History of Science - Spore forming bacteria (G Gould)

Tuesday 5th July

An update on the Taxonomy and Physiology of spore formers

09.00–9.35 **Taxonomy of aerobic endospore formers**
N Logan, Strathclyde, UK

09.35–10.10 **Clostridial taxonomy/ molecular genetics**
M Bennik, IFR

10.10–10.45 **Mechanisms of the resistance of bacterial spores to radiation, heat and chemicals**
P Setlow, Connecticut, USA

10.45–11.15 **Coffee**

11.15–11.50 **Spore structure**
A Moir, Sheffield, UK

11.50–12.25 ***B. anthracis* – spore germination in macrophages**
M Mock, Institut Pasteur, France

12.25–13.00 **Genomics**
O Kuipers, Groningen, The Netherlands

13.00–14.00 **Lunch**

Spore formers and food microbiology

14.00–14.35 ***B. sporothemodurans* and other spore formers in milk**
Dr Lieve Herman, Ghent, Belgium

14.35–15.10 **Non-proteolytic *Clostridium botulinum* and the safety of minimally heated foods: an emerging issue?**
M Peck – IFR

15.10–15.45 **Thermal inactivation of Alicyclobacillus spores in fruit product processing**
C Silva, Portugal

15.45–16.15 **Tea**

16.15–16.50 **Offered papers**

17.00 onwards: Trade Show

Wednesday 6th July

Health/Therapeutics

09.00–09.35 **Spores as vaccine vehicles**
S Cutting, Royal Holloway, UK

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

BOOK NOW ONLINE!

Members and Non-members who wish to book their place at this conference and elect to pay by credit or debit card can now book online via the website in moments. To book and pay online simply point your browser at: www.sfam.org.uk/sumconf.html

CPD ACCREDITATION

A total of **22 credits** have been awarded for this meeting

Trade Show

Anyone wishing to exhibit at the trade show please contact Marisa Ramsay at the Society Office.
Email: marisa@sfam.org.uk

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

CPD ACCREDITATION

A total of **22 credits** have been awarded for this meeting

Trade Show

Anyone wishing to exhibit at the trade show please contact Marisa Ramsay at the Society Office.
Email: marisa@sfam.org.uk

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

Programme

09.35–10.10 **Clostridium spores as mediators to target therapeutic proteins to tumours**
J Anne, Leuven, The Netherlands

10.10–10.45 ***B. cereus***
A Kolsto, Oslo, Norway

10.45–11.15 **Coffee**

11.15–11.50 ***C. difficile***
I Poxton, Edinburgh, UK

11.50–12.25 **Anthrax vaccines**
L Baillie – Rockville, UK

12.25–13.00 **Offered papers**

13.00–14.00 **Lunch**

Animal Health

14.00–14.35 **Probiotics**
Le Hong Duc, Royal Holloway, UK

14.35–5.10 **Do bacteria really need to be regulated?**
P Silley, MB Consult Ltd, UK

15.10–15.45 **Necrotic enteritis, the way forward**
Dr Shabbir Simjee, Elanco Animal Health

15.45–6.00 **Tea**

16.00–17.30 **Student Offered papers**

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

18.00–18.30 **SfAM Annual General Meeting**

20.00 onwards: Society Dinner

Thursday 7th July

Environment /Applications

09.30–10.05 ***B. thuringensis***
N Crickmore, Brighton, UK

10.05–10.40 **Practical applications of the biotracer *Bacillus globigii***
C Hodgson, Huddersfield, UK

10.40–11.15 **Bacillus protein secretion: a game of snakes and ladders!**
C Harwood, Newcastle, UK

11.15–11.50 **Coffee**

11.50–12. 30 **Spore- forming bacilli as biocontrol agents against fungal pathogens**
B Seddon, Aberdeen, UK

12.30–13.00 **Bacillus species in the intestine of invertebrates**
H König, Mainz, Germany

13.00–14.00 **Close of Conference and Lunch**

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

BOOK NOW ONLINE!

Members and Non-members who wish to book their place at this conference and elect to pay by credit or debit card can now book online via the website in moments. To book and pay online simply point your browser at: www.sfam.org.uk/sumconf.html

BOOKING FORM and INVOICE

SFAM SUMMER CONFERENCE 2005 4 - 7 JULY 2005

Spore forming bacteria: emerging and re-emerging issues

Only ONE person per form please. If additional forms are required please photocopy this one. CLOSING DATE FOR REGISTRATIONS: Friday 10 June 2005. A LATE BOOKING FEE of £30.00 will be applied to all bookings made after this date.

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FEES

	Full Members	Student, Honorary, Associate & Retired Members	Student Non - Members	Non - Members
Whole Conference Rate: inclusive of registration fee, coffee breaks, lunches, dinners, including Society dinner and accommodation in The Old Ship Hotel for the entire conference	£450.00	£300.00	£400.00	£650.00
Day Rate: 08.30 - 17.00 hours per day, or part thereof, inc. of registration fee, coffee, lunch and tea	£95.00	£50.00	£95.00	£150.00

YOUR COSTS

Charges - please tick the applicable box(es)	Amount
☐ **Whole Conference Rate:**	£
☐ **Day Rate** (please tick the DAY(S) you wish to attend): **Tues 5th:** ☐ **Weds 6th:** ☐ **Thurs 7th:** ☐	£
☐ **I wish to attend the Society Dinner on Wednesday evening (This is included in the Whole Conference Rate but costs £50.00 for delegates who elect to pay the Day rate).** Please note that numbers are limited**:**	£
☐ **Additional overnight accommodation per night inclusive of breakfast: £120.00.** If you wish to stay extra NIGHTS please enter the additional NIGHTS you wish to stay: _____	£
☐ **LATE BOOKING FEE** Payable for all bookings made after Friday 10 June 2005	**£30.00**
TOTAL AMOUNT REMITTED:	£

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_____ **Postcode:**_____

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

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

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YOUR PAYMENT

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

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

TOTAL Amount enclosed/ to be debited: (*Remember to include your LATE BOOKING FEE if your are booking after 10 June 2005) **£** _____

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

STUDENTSHIP Application

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

SFAM SUMMER CONFERENCE 2005 4 - 7 JULY 2004

☐ **I wish to apply for a SfAM Studentship grant to attend the 2005 SfAM Summer Conference**

About this award

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

Your details

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Address:_____

_____ **Postcode:**_____

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

University or College:_____

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

Grant authority:_____

Your intended career:_____

Your costs

Expected Travel Costs:_____

Other costs - please specify:_____

_____

_____

Why do you wish to attend this meeting?

Please give your reasons:_____

_____

_____

Your signature:_____ **Date:**_____

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

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

Your Supervisor's support

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

_____

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

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

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

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

Please return your completed application by fax or post to: **The Society for Applied Microbiology,**
The Blore Tower, The Harpur Centre, Bedford MK40 1TQ, UK. Tel: 01234 326661. Fax: 01234 326678. Email: meetings@sfam.org.uk

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

CCFRA Food Micro International Conference 2005

Thursday 9 to Friday 10 June 2005

Campden & Chorleywood Food Research Association, Chipping Campden, Gloucestershire, UK

information

This conference will provide the forum for eminent food microbiologists to present research findings and offer opinions and hypotheses for debate. The combination of keynote lectures and presentations will compliment practical workshops and displays of the most up-to-date technology in microbiological assessments.

REGISTRATION: Please contact the Training Department on: **Tel: (0)1386 842104** or Email: **training@campden.co.uk**

Keynote Lectures: Day 1 - Professor Tom Humphrey, University of Bristol, UK. **Day 2** - Professor Michael Doyle, University of Georgia, USA

Lecture Sessions: Food Safety; Microbiological Criteria & Methods; Food Stability/ Shelf life and Manufacturing Concepts.

Workshops: Microbiological Modelling and Identification/Methods

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www.BioScience2005.org

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The three best posters presented at the meeting will be awarded the **New England Biolabs Poster Prize.** The **Promega UK Young Biochemist 2005** and **Pfizer Prize** will also be awarded for the best oral communications.

Join us

Join the Biochemical Society before the meeting and benefit from reduced registration fees. Membership fee: **Full £52**, **Student £15**
www.biochemistry.org/membership/default.htm

16th International Organization for Mycoplasmology Biennial Congress

St John's College, Cambridge, UK. 9th - 15th July 2006

The congress is being supported and organised by the Veterinary Laboratories Agency (Weybridge) and will include sessions on human, plant and insect mollicutes, including spiroplasmas, hemoplasmas, molecular genetics and taxonomy relating to this interesting group of organisms.

information Events Organisation Unit, VLA (Weybridge), Woodham Lane, Addlestone, Surrey KT15 3NB UK.
Tel: **+44 (0)1932 357234.** ● Fax: **+44 (0)1932 357701** ● Email: **j.snook@vla.defra.gsi.gov.uk**

INSTITUT PASTEUR

Institute Pasteur series of Conferences

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

Nutrition, Immune function and Health

9th - 10th June 2005, Paris, France
Further information:
http://www.pasteur.fr/applications/euroconf/nutrition/index.html

Mastering anti-infective therapies

20th -21st October 2005, Paris, France
Further information:
http://www.pasteur.fr/applications/euroconf/antiinfectionstherapies/index.html

Email: euroconf@pasteur.fr

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

Health Protection Agency Annual Conference 2005

12 -14 September 2005
Warwick University, UK

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

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

CALL FOR ABSTRACTS

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

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

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

BioTechnology Convention 2005
EXCel, London 11th- 13th October
www.cordiaconvention.com

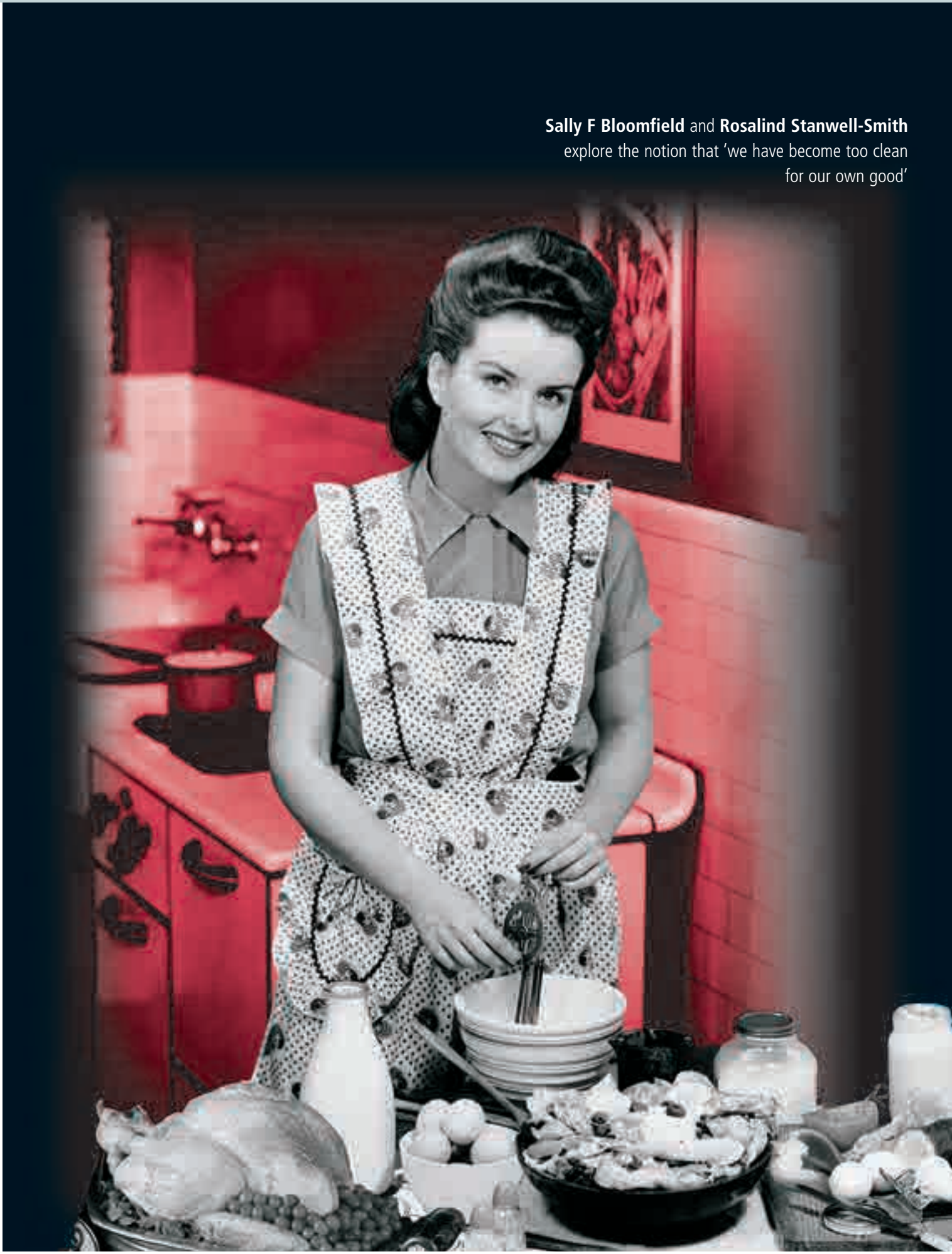
The Programme features: 41 individual topics presented by over 140 industry-leading specialists across white, green and red biotech; 6 key topics and 12 sessions dedicated to emerging markets. In addition to this CORDIA features Masterclass Workshops in: Intellectual Property Law, Licensing and Capital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

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

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

Sally F Bloomfield and **Rosalind Stanwell-Smith**

explore the notion that 'we have become too clean for our own good'



Let them eat dirt..

..but don't forget the hygiene

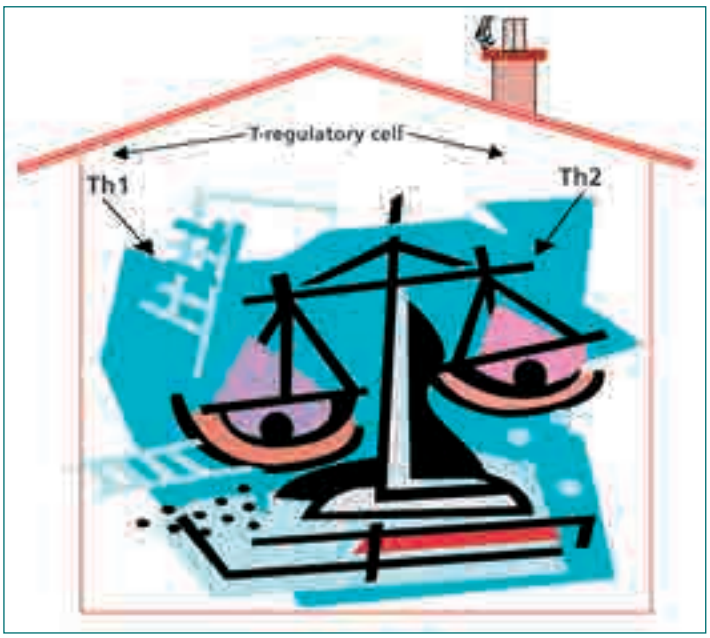
THE 'HYGIENE Hypothesis was first postulated in 1989 by Strachan[1] who reported an inverse relationship between family size and development of atopic disorders. From this, he hypothesised that a lower incidence of infection in early childhood, transmitted by unhygienic contact with older siblings, or acquired pre-natally, could be a cause of the rapid rise in the atopic disorders over the last thirty to forty years.

A further aspect of Strachan's hypothesis was his proposition that the reason why this exposure no longer occurs is, not only because of the trend towards smaller families, but also "improved household amenities and higher standards of personal cleanliness". The decision to name it the "hygiene" hypothesis made it memorable but is possibly misleading. With the significant attention from the media, the popular notion has arisen, that we have become "too clean for our own good".

The publicity given to this concept has aroused concern amongst infectious disease (ID) specialists who fear that publicising the idea of being "too clean" could have a detrimental impact on the public's perception of ID risks, and the importance of controlling them. In response to these concerns the International Scientific Forum on Home Hygiene (IFH) (www.ifh-homehygiene.org) commissioned a review of the hypothesis and its implications for hygiene, particularly in the domestic setting. The review addressed two distinct aspects of the hypothesis:

- the evidence for a causal link between reduced microbial exposure and the recent rises in atopic disease
- whether cleaning and hygiene, as opposed to other influences on microbial exposure, could be a significant factor

This review summarises the main findings of the report[2].



The link between atopy, and microbial exposure and infection

Although many of the studies cited in support of the hygiene hypothesis are based on proxy measures of microbial exposure, some provide striking evidence supporting a causal link between atopy and microbial exposure. A consistent finding is the inverse relationship between atopy, family size and, to a lesser extent, birth order. There is also an apparent protective effect for children brought up on a farm. In addition there are numerous contradictory studies, and overall the evidence remains inconclusive.

Some proponents suggest that the infection exposure necessary for the critical immune priming should be sufficient to cause clinical disease. ID surveillance trends do not support a temporal relationship with the rapid rise in atopy in the 1970s - 1980s. The decline in serious infections such as cholera, typhoid and tuberculosis occurred too early to be associated with the late 20th century rise in atopic disease. The decline in measles in the UK dates from the introduction of the national vaccination programme in 1988. Similarly, the decline in hepatitis A virus since 1994, following the introduction of an effective vaccine, postdates the rise in atopy. Whilst "old" infections have declined, this has been offset by the emergence of new infections, or those which have re-surfaced (e.g. tuberculosis).

Introduction of measures to reduce ID, such as improved housing, sanitation and clean water, correlate with the decline in enteric diseases during the early 20th century, rather than the later rise in atopy. Reduced consumption of food-borne pathogens is also an unlikely candidate since the incidence of food poisoning rose during the critical period of the rise in atopy.

Intuitively, the idea that exposure to invasive infection, with all its attendant risks, might be needed to protect against atopy seems inefficient in evolutionary terms. A more plausible proposition is that exposure to milder endemic infections is the key. As far as morbidity is concerned, however, there is no evidence of a decline across the broad range of gastro-intestinal, respiratory and other common infections.

Additionally, although the findings of a recent study in Denmark[3] confirm that larger family sizes, early childcare, pet keeping and farm living correlate with decreased risk of atopic dermatitis in children before 18 months, the data suggests that development of ID in early life is associated with increased, rather than reduced, risk of atopic dermatitis.

An alternative possibility is that 'background' exposure to "subclinical" doses of pathogens, or to commensal or environmental microbes, or perhaps to endotoxins, is the key. In a recent paper Rook[4] proposes that immune dysregulation associated with increased risk of atopy is a

consequence of decreased exposure to microbes that are "old friends", because of their continuous presence throughout mammalian evolution. He proposes that organisms such as saprophytic mycobacteria, helminths and lactobacilli are recognised by the immune system as harmless, and as adjuvants for immune regulation. The protective effect of farm living is consistent with the possibility that 'background exposure' from our outdoor environment is a factor.

Despite some good evidence supporting a link between microbial exposure and atopy, clear evidence is still lacking as to the nature of the critical changes in microbial contact that might have occurred, whether it is the general level of exposure which is important, or exposure to specific microbes, whether exposure is only important at certain times of life, whether the route of exposure is important etc.

The link between atopy, microbial exposure and hygiene practice in the home

The second question is whether the changes in microbial exposure, which may be causing immune dysregulation, are the result of modern trends in hygiene and personal cleanliness.

Evidence of a link with domestic hygiene is weak. Data published since the 1980s suggest that modern homes, whatever their visual appearance, still abound with a rich mixture of bacteria, viruses, fungi and moulds, as well as dust mites and other insects, and that opportunities for exposure are likely to have increased rather than decreased, since a rising proportion of time is spent indoors.

Microbes are continuously brought into the home via humans, animals, food etc. Transmission of these microbes via hands, surfaces and cloths, during normal daily activities, provide ample opportunities for exposure to foodborne pathogens or pathogens from infected people or pets, as well as exposure to commensals and environmental microbes. There is no evidence that increased consumption of cleaning products is associated with more time spent on home cleaning; the per capita consumption for individual European countries show no correlation with levels of atopy. In reality, routine daily or weekly cleaning has little effect in reducing microbial exposure, even where they involve use of a disinfectant. Re-colonisation of surfaces rapidly occurs and many species are adapted to survival for long periods, particularly on damp surfaces, but also on apparently dry surfaces. Contrary to perception, cleaning can actually increase the distribution of microbes in the home. Whilst "hygiene" practice (i.e the specific actions we take to prevent transmission of disease) has been shown to be associated with reduced infection rates, observational studies indicate that consumer adherence to basic hygiene rules remain poor, suggesting that we are regularly exposed to pathogenic as well as commensal and environmental microbes.

The suggestion that trends towards more frequent showering and bathing show a temporal correlation with the rise in atopy is superficially consistent with the results of the ALSPAC Study[5], but requires further investigation. The study showed a relationship between "hygiene scores" and atopy in young children, but focussed on "routine cleansing" rather than "targeted hygiene" i.e "parents were scored according to how often in a day they wiped the child's face and hands, whether hands were wiped before meals and how often the child was given a bath or shower".

From the evidence linking atopy to declining family size, it can be argued that, regardless of hygiene behaviour, a decrease in the number of people in the home inevitably decreases opportunities for person-to-person transfer of human commensals, or case-to-case spread of infections via direct or indirect contact or airborne transmission. However, if exposure to childhood infections or commensals is important it should be found that the effects of declining family size are offset by increased opportunities for exposure from attendance at day nursery. Although there is some supporting data, other studies show no evidence of a protective effect.

Quite apart from hygiene, there are a number of other lifestyle, medical and public health trends which could equally well have caused incidental changes in microbial exposure, manifesting as increased risk of atopy. For example, changes will have occurred in the non-pathogenic microbial flora of water or foods consequent on changing technologies of water purification and food production etc, but since food and water is only routinely monitored for pathogen content there are no data to show what these trends might have been. Alternatively the changes may have been generated by the introduction of antibiotics. Although this fits well with the rise in atopy in temporal terms, the supporting evidence is inconsistent. The balance of evidence is also against vaccination as a causative factor. More important perhaps is the significant evidence supporting a range of 'non-microbial' factors, such as diet, obesity and lack of exercise which may be causative factors in the rise in atopy.

The implications for hygiene practice

On the basis of current evidence, relaxing hygiene standards seems neither justified, nor rational. On the contrary, current concerns about ID provides compelling reasons why we should not do this.

Although ID mortality is

declining in the developed world, trends in morbidity suggest changing patterns of ID rather than declining rates. This is partly associated with the continual emergence of new infections, such as *Campylobacter* and *Escherichia coli* O157, and re-emergence of old pathogens such as tuberculosis. Infectious intestinal diseases remain at unacceptably high levels, but could be greatly reduced through better standards of hygiene. Globalisation of food markets, increased travel and refugee movements mean that pathogens more readily and quickly reach areas where

there is little innate resistance. There is now evidence that hygiene plays a role in reducing the spread of cold and flu viruses. Of particular concern is the rising proportion of the population who are more vulnerable to infection. This includes the elderly, the very young, people with chronic or degenerative illness and immuno-compromised patients discharged from hospital, all of whom are increasingly cared for at home. Currently, about one person in six in the UK belongs to an 'at risk' group, and it is likely that the same applies in most European countries. In addition, pathogens are increasingly implicated as co-factors in cancers and some degenerative diseases.

Developing a rational approach to home hygiene

Regardless of whether the hygiene hypothesis is correct, the popular interpretation that 'dirt is good for us'[6] has considerably influenced attitudes, and caused loss of confidence among the public regarding home hygiene. One positive benefit however is a recognition by public health professionals of the need to provide clearer guidance. One of the concepts which we need to clarify in the mind of the consumer is the difference between "dirt" and "germs", and between "cleanliness" and "hygiene". Without knowing the nature of the microbial exposure which may be critical for immune priming, it is difficult to reformulate hygiene policy, in favour of improving immune function without compromising protection against ID, but some progress is being made.

As a part of its work to promote better understanding of hygiene and better hygiene practice, the IFH has produced guidance documents on home hygiene[7,8]. The key feature of the guidelines is that they are based on the concept of risk assessment and risk prevention[9]. The guidelines start from the premise that homes always contain harmful microbes (from people, pets, food, etc.) and that ID prevention is about targeting measures in the places and at the times that matter, in order to limit risks of exposure. Hygienic cleanliness (reduction to a level that does not pose a significant threat) is required only where infection risk is significant, e.g. after contact with excreta, during food preparation etc. Whatever the reality regarding the hygiene hypothesis, "targeted hygiene" makes sense because it seeks to maximise protection against ID, whilst retaining any beneficial effects which microbes may have on our human and natural environment.

Although this review concludes that the relationship of the hypothesis to hygiene practice is not proven, it lends strong support to initiatives seeking to improve hygiene practice. It would however be helpful if the hypothesis were renamed, e.g as the 'microbial exposure' hypothesis. Avoiding the term "hygiene" would help focus attention on determining the true impact of microbes on atopic diseases, while minimising risks of discouraging good hygiene practice.

Sally F Bloomfield and Rosalind Stanwell-Smith

About the authors

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■ Rosalind Stanwell-Smith is an independent public health consultant and Scientific Adviser to the Royal Institute of Public Health

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The secret life

In the first in a series of articles about the peer-review process, **Will Wilcox** explains the elusive world of article production

IF THE FUNCTION of science journal publishing is the dissemination of scientific information to the largest possible number of people, then surely we have never had it so good.

More people have access to more journal content than ever before, and this is largely due to the way in which new technology has been employed in the preparation and distribution of scientific publications. However, the World Wide Web offers much more than just a cheap alternative to the postal system. Taking advantage of the Web's potential to help readers navigate through the ever increasing volume of research output requires an article to contain much more than just text and pictures. In most cases, it is a publisher who is charged with the task of taking an author's manuscript and transforming it into the fully-linked and typographically accurate version that appears in the Web and print editions of a peer-reviewed journal. A great deal of this work takes place 'under the hood', so what exactly does happen to your article once it has been accepted for publication?

The versatile file

Within a publishing company like Blackwell, it is the job of the Production Department, and specifically the Production Editor responsible for each journal, to manage the transformation of authors' manuscripts into their final published form. Many different processes need to be completed, but it is possible to describe just about all of the work of the Production team as the application of standards. We all use standards of communication every day in order to be understood. The

# of an article

language we use, punctuation and sentence structure have all developed over thousands of years into an effective system for communication between humans. However, these standards have had to evolve still further since we started asking machines to mediate in our communications. Not only must the text of a scientific paper clearly be understood by the reader, but the same information must be capable of functioning in both the e-environment of the 21st Century, and via printing technology whose principles have changed little since the 15th! A great deal, therefore, is asked of the files that an author submits to a journal, and it is the task of the journal's Production Editor to ensure that they have all the answers.

Guidelines for success

Nothing is possible, of course, without the work that the author puts in to preparing the manuscript. It is important that the Production Editor has all of the information he or she needs to process the article, and a great deal of time can be saved if the author has complied with the journal's Submission Guidelines. This can be seen as an onerous task, but nearly all of the requirements are designed to ensure that the article can be processed as efficiently as possible, and that the output is as close to the author's original intent as it can be. Especially important is the preparation of electronic graphics files, although it is here that the publisher's requests for Encapsulated PostScript or high-resolution TIFF files must seem most unreasonable. Again, these requests are made to try to ensure the best possible communication of the

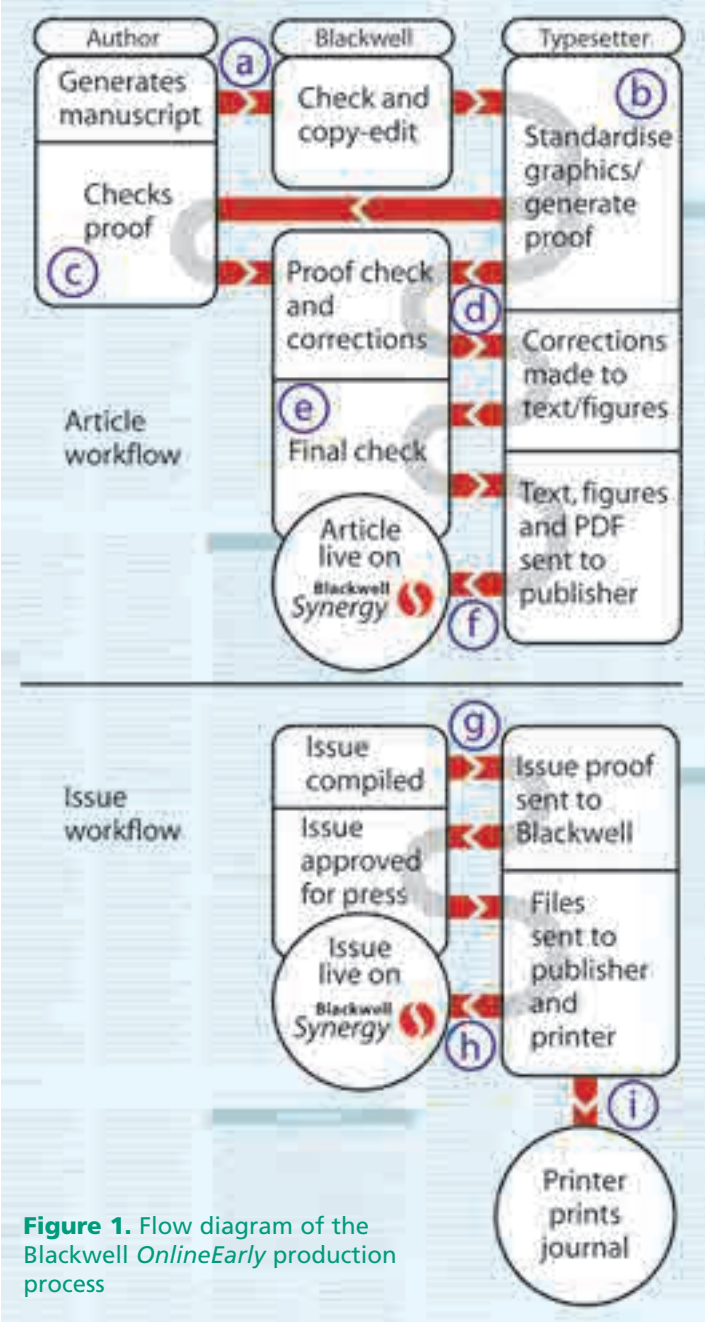


Figure 1. Flow diagram of the Blackwell *OnlineEarly* production process

image's content to the reader across all media. It is unfortunate that even the most modern desktop software has failed to embrace the task of preparation of graphics to publishing standards, and that the software for producing higher quality graphics tends to have a price tag to match. But it is possible to produce high-quality graphics by following some simple procedures that all publishers provide in their author guidelines. A little time spent on this aspect of manuscript preparation can pay dividends in the speed of publication and the effectiveness of the article.

After all the hard work by the authors and reviewers, the accepted manuscript is sent to the publisher by the Journal Editor (Fig.1a). The first job is to make sure that the article information is logged onto a system that helps the Production Editor keep track of articles at all of the various stages of the production cycle. It is at this point that the article gets its all-important DOI (Digital Object Identifier; see Glossary). This number stays with the article for the rest of its life, and it will allow readers to find and cite the article, even if it moves around on the Web.

It's all in the edit

Once the Production Editor is satisfied that the manuscript is complete and in a publishable format, the article moves into the most important part of the process. The Production Editor either copy-edits the article him/herself or sends it on to a freelance copy-editor or supplier. At Blackwell, the copy-editing stage is the engine room of the whole production process, in which the author's manuscript and graphics are transformed into a highly specialised set of standardised files (see 'From Word to XML' in the box below). These files are important because their formats are generic and do not rely on proprietary software for their interpretation. This makes them suitable not only for driving the various printed and electronic versions of the published article, but also for long-term archive storage of the information. Native word-processed or desk-top-publishing files require reader software to be available in the future if they are to be viewed, but the standardised files produced by the publisher's production process are much more durable, and they are not subject to the market variables that determine compatibility decisions in commercial software development.

The complex process of preparing these files to the

From Word to XML

A normal word-processed file contains a great deal of information in addition to the actual content of the article that we see on the page. Most of this information deals with the way that text should appear. For example, there are codes to centre or justify text, to display it in a particular font, with bold or italic emphasis, or in tabular form.

However, publishers currently need to be able to use the same file produce both the print and online versions of the article, and it will not be long before we routinely deliver articles to mobile telephone or PDA devices as well. All of these place different restrictions on the way that text and images can be displayed. This versatility cannot happen if the files we use are constrained to display information in a particular way, so we must replace all of the information about how the content should look with a new set of codes that defines the article in terms of what the content actually represents.

At Blackwell, we use a system of predefined 'tags' that conform to an international standard language called eXtensible Markup Language, or XML (see glossary). In our XML files, each element of the text such as the title, section headings, authors' surnames and forenames (and so-on) is identified throughout the document. The denser the tagging structure, the greater the versatility of the resulting file and the number of automated links that can be generated to external databases.

The result is a compact, structured, plain-text file that is easily transportable and can be validated against a set of rules to ensure that the tagging has been carried out properly. The resulting XML file, along with the article's standardised graphics, can then be passed through a set of display instructions, called a style sheet, depending on the type output that is required. Different style sheets can be used on the same XML file to produce the complex typography of the print, or to produce HTML files for Web display - the latter using the article tagging to produce extra functionality like reference linking.

correct technical standard demands a certain amount of automation, but the traditional standards of language, consistency and journal style still have paramount importance in the copy-edit process. Human copy-editors are indispensable in these aspects of the article's preparation as well as for overseeing the technical side of the editing process.

The proof of the pudding

After the text and graphics files have been standardised, they can be put together into a proof that represents the layout and content of the article as it will appear in print. For the majority of Blackwell journals, this is carried out by typesetters based in India and China (Fig. 1b). We have been working alongside these suppliers for many years now, a practice that allows us to tap into a highly motivated workforce with cutting-edge technical abilities. In turn, they have enabled us to increase the speed and efficiency of journal publication, and add many new features to our production services. The typesetters feed the article files into high-end typographic systems, where style sheets are applied to produce a first page proof of the article, with all graphics and tables incorporated. These are output as PDF files to send to the author for correction. Any queries raised during the copy-editing process are also marked on these proofs for the author's attention. It is important that the author checks the article carefully to ensure that no meaning has been altered during the copy-edit and subsequent processing (Fig. 1c).

Once the author has returned his or her changes to the Production Editor, they are checked and forwarded to the typesetter to be corrected on the master files (Fig. 1d). The typesetter will then create a new, revised, proof and send it back to the Production Editor, who will check that all of the changes have been made correctly (Fig. 1e). At this point, it is possible for the article to be published, even before it has been allocated to a journal issue (Fig. 1f). At Blackwell, we call this service *OnlineEarly*, and authors of articles in *OnlineEarly* journals can enjoy much faster publication times than would otherwise be the case if an article had to wait for inclusion in the next available issue. *OnlineEarly* articles are in their final, corrected form, lacking only volume and issue details and page numbers, but they can still be cited using their DOI, which will work even after they have subsequently been incorporated into a journal issue.

You thus have publish'd me!

Articles accumulate in *OnlineEarly* until the time comes when the Production Editor is scheduled to compile the journal issue. Articles for inclusion in the issue are compiled into a running order, which is sent to the typesetter for the addition of page numbers and bibliographic information to the master files (Fig. 1g). Also finalised at this stage are the issue covers, advertising and any other additional content such as editorials or news sections. The typesetter takes delivery of all of these disparate elements and puts them together into the final, compiled issue for publication. After a final check by the Production Editor, the amended files are returned to the publisher for mounting on the Web (Fig. 1h), and print-quality PDF files are prepared for despatch to the printer. The print files can be hundreds of megabytes in size, and are transferred electronically to the printer for manufacture of the final, printed journal (Fig. 1i). Here, again, the earlier work on standardisation comes into effect. The efficiency of the transfer process and the reliability of the files is increasingly important as the printer can be based anywhere in the world. These days, improvements in technology are allowing more and more journals to be printed in places like Singapore, and many Blackwell journals are already using this route with great success.

The quest for readers

After the printed issues have been despatched to subscribers, you would be forgiven for thinking that the work of the publisher is over. However, this is far from being the case as PDF or conventional offprints still need to be processed and despatched to authors, so that they can publicise the article among their colleagues. In addition, article data are transmitted to a huge and ever-growing number of external databases, such as legal deposit libraries and abstracting and indexing bodies. Registration of information in as many different databases as possible enables the greatest possible exposure of an article to potential readers. However, most of these organisations require data in different formats, so further processing is required prior to transmission. For newsworthy articles, press releases are issued, which can stimulate increased readership and citation. Finally, copies of the full article are also sent to archiving organisations to ensure long-term preservation.

So next time you are reading an article in your favourite journal, remember that it has been on a journey that has taken it through many transformations using complex technologies, and to exotic locations all over the World. There really is more to the secret life of a journal article than meets the eye.

Glossary

DOI Digital Object Identifier. A standard for persistent online content identification and linking. See http://www.doi.org

HTML Hyper-Text Mark-up Language. The current standard for delivery of content over the Web. It consists mainly of layout and display information and also enables linking both within a page (e.g. between text citations and the reference list) and to pages elsewhere on the Web (e.g. bibliographic databases such as Web of Science).

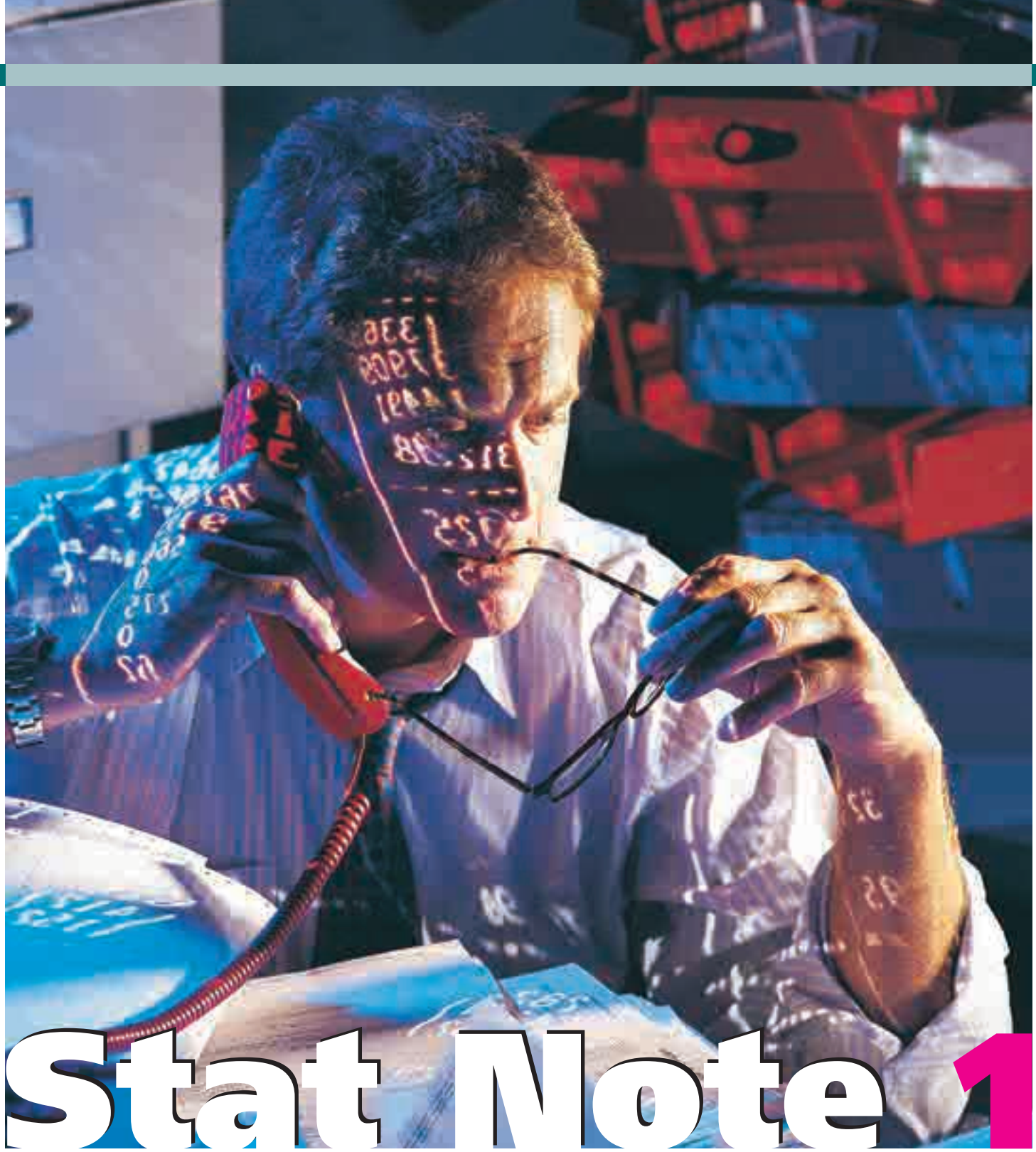
PDF Portable Document Format. A platform-independent, commercial file format for presentation of page-based material. PDF files will display in exactly the same way on any machine. PDF format is also used to transfer page information from typesetters to printers.

XML eXtensible Markup Language. An international standard for the definition of device-independent, system-independent methods of representing texts in electronic form. XML is a subset of another standard, SGML, constituting a particular text markup language for interchange of structured data. See http://www.w3.org/XML/

COMING SOON...

The second article in this series will answer all your questions about copyright issues. Write to me at: **lvharper@dialstart.net** with any questions you have on any copyright matters and we will ask an expert for the answers!

William Willcox
Journal Production Manager, Blackwell Publishing



Stat Note 1

In the first of a series of articles about statistics for biologists, **Anthony Hilton** and **Richard Armstrong** talk about the distribution of data — are they normal?

Is the data normal? Chi Squared and the Kolmogorov-Smirnov test

The first stage of any statistical analysis is to determine the degree to which, if at all, the data depart from normality. Having established the distribution of the data, parametric or non-parametric statistical tests may be applied as appropriate. Microbiological data, especially from environmental sources, may have very large counts and associated standard deviations, and are unlikely to be normally distributed. In this StatNote we describe the application of two tests of normality.

The Scenario

The domestic kitchen is increasingly recognised as an important reservoir of pathogenic microorganisms, with dishcloths and sponges providing an ideal environment for their growth, survival and dissemination. Given the intrinsic structural and compositional differences between these two material types, a study was envisaged to investigate if one provided a more favourable environment for bacterial survival than the other; the hypothesis being that there would be a quantitative difference between the number of microorganisms recovered from dishcloths compared to sponges. A total

Table 1. Observed and expected frequencies for the sponge data. (Tests of normality: chi-square (all categories) = 38.99 (P<0.01); chi-square (adjusted for expected values <5) = 4.80 (P>0.05); Kolmogorov-Smirnov (KS) test = 0.0894 (P > 0.05)

Category (upper limits)	Observed F	Expected F	O — E
<=5000000	6	5.78	0.22
60000000	11	7.91	3.09
115000000	8	10.864	-2.86
170000000	14	10.33	3.67
225000000	4	6.795	-2.795
280000000	1	3.09	-2.09
335000000	0	0.98	-0.97
390000000	1	0.21	0.79
445000000	1	0.03	0.967
< Infinity	0	0.003	-0.003

O = Observed frequency, E = Expected frequency

of 54 'in-use' dishcloths and 46 sponges were collected from domestic kitchens and the aerobic colony count of each determined in the laboratory.

How is the Test Done?

To fit the normal distribution, the variable (aerobic colony count on 46 sponges) is first divided into frequency classes describing the range of the variable in the population. In the present case, ten classes were used for the sponge data (Table 1). The limits of these classes are then converted so that they are members of the standard normal distribution. To carry out this calculation, the mean and standard deviation of the observations are first calculated. The sample mean is then subtracted from each class limit and divided by the standard deviation, which converts the original measurements to those of the standard normal distribution. Tables of the standard normal distribution are then used to determine the expected number of observations that should fall into each class if the data are normally distributed. The observed and expected values (Fig. 1) are then compared using either a chi-square 'goodness of fit' or a Kolmogorov-Smirnov (KS) test. This statistical analysis is available in many of the popular statistical analysis software packages such as Prism, Statview, SPSS or Statistica.

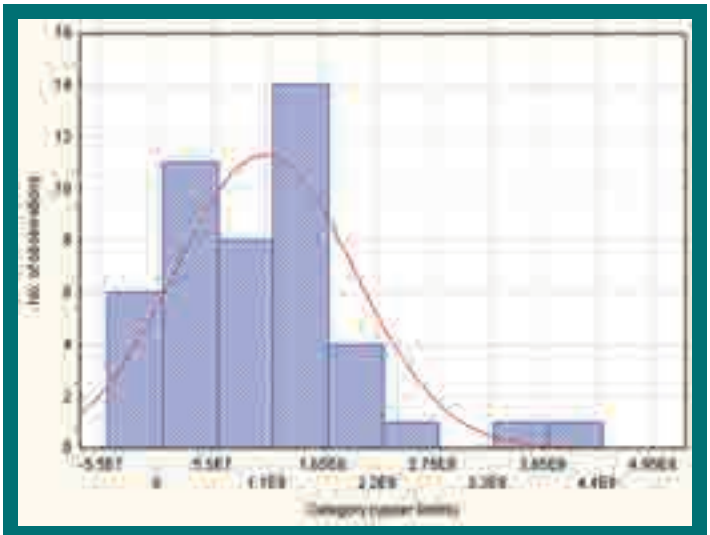


***Figure 1.** Histogram illustrating the observed distribution of values for the sponge data and the predicted normal distribution (continuous line). The chi-square goodness of fit and Kolmogorov-Smirnov tests test the difference between the observed and expected frequencies.*

How do you Interpret the results?

The chi-square (χ^2) test (7DF.,χ^2 = 38.99, P<0.01) for the sponge data is significant at the 1% level of probability suggesting that the distribution deviates significantly from the normal distribution. The Kolmogorov-Smirnov test (KS=0.089, P> 0.05), however, is not significant, a not uncommon result since this test is less sensitive than chi-square and only indicates gross deviations from the normal distribution (Pollard, 1977). The chi-square test also has limitations in this context as it is greatly affected by how many categories are selected to define the variable and how these categories are divided up. In addition, if a number of the categories have expected numbers of observations below five, adjacent categories should be combined until their expected values are greater than five. If this procedure is carried out using the present data, the value of chi-square is not significant. In cases like this, the general shape of the observed distribution is probably the best method of judging normality. Although this distribution (Fig. 1) exhibits a degree of skew, the deviations from normal (supported by the KS test) suggest the deviations are not significant enough to warrant using a non-parametric test. However, a similar analysis carried out on the cloth data resulted in considerable deviations from a normal distribution on both tests (χ^2 = 3007.78, P < 0.001; KS = 0.28, P < 0.01). Hence, in an analysis to compare the cloth and sponge data it may be prudent not to use a parametric unpaired t-test. In this case, we have two ways in which to proceed to compare the two groups: (1) transform the data to normality thus allowing the application of the parametric 'unpaired' t-test, or (2) employ the non-parametric equivalent, the Mann-Whitney test. Both procedures will be illustrated in future StatNotes.

Summary

Testing whether an observed distribution of observations deviates from normality is a common type of statistical test available in statistics software. Most software offer two ways of judging whether there are significant deviations of the observed from the expected distributions: chi-square and the KS test. These tests have different sensitivities and problems and often give conflicting results. The results of these tests together with observations of the shape of the observed distribution should be used to judge normality.

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

BUGS CV

We have received an enquiry from the following individual, name of *Lactobacillus acidophilus*. Claims to be a thoroughly good bug, doesn't harm anyone. Lots of relatives too, they call themselves probiotics, friendly bacteria. They say if you drink them (well a few million of them) you will feel the difference in a fortnight. The idea seems to be catching on, the probiotic drink market (*Yakult*, *Actimel, TESCO Probiotics, Flora Pro-Active*) is increasing 50-70% per year and is currently worth £135 million in the UK alone. This applicant has impeccable credentials, has even had the genome sequenced. We have reproduced the CV below and would be pleased to hear from any friends and relatives or anyone who can support or reject these claims.

Name:

Lactobacillus acidophilus NCFM. I have sometimes been called other names like N2, NCK56, NCK45 and RL8K, but I'm really the same bug.

Address:

Intestines of healthy humans. I have been found in pigs and chickens and I'm commercially available as well (Rhodia Inc., Madison, WI). You might find me in cheese, yogurt and other products such as fermented milks, various probiotic yogurts, dried dietary supplements. With my friends and relatives, "the friendly bacteria", we are turning up in all sorts of products that claim to make you feel good.

Date of Birth:

I was first isolated from a human source in the early 1970s and was brought up in the food microbiology laboratories at North Carolina State University, Raleigh, NC by M. Speck and S. Gilliland (see referee 1).

Relatives:

I am closely related to *Lactobacillus acidophilus* ATCC 4356. Our genes are virtually the same so we look and behave the same. You may have heard of some of my *Lactobacillus* cousins: *helveticus*, *salivarius*, *casei*, *plantarum*, *fermentum*, there are lots of us.

Appearance:

I have a very smart appearance, long smooth Gram-positive rods with no slimy coat and no spores to disfigure me. I don't move but I can stick to human intestinal cells, Caco-2 and mucus-secreting HT-29 cells.

Properties:

I can grow at temperatures up to 45°C, and can survive quite well frozen for weeks at -20°C. When I'm dried I don't survive quite so well but I'm happy for months in the fridge as long as I'm in a yogurt. I can protect myself, I make lots of lactic acid (both D and L) and a little bit of hydrogen peroxide. I produce a small protein antibiotic called lactacin B that acts as a natural antibiotic, killing undesirable microorganisms. Some say I can remove cholesterol from growth media.

My genes:

I have just been sequenced (referee 2) so you can look up my entire genome (http://www.ncbi.nlm.nih.gov/genomes/lproks.cgi). I have 1.99 million base pairs, 34.7% of which are GC.

Background:

My family are known as the Lactobacillaceae and the *Lactobacillus* genus is the largest of the lactic acid bacteria group, with over 50 species in total, characterised by our metabolic products produced. We are commonly found in the oral, vaginal, and intestinal regions of many animals. We are important as industrial microbes, contributing to the production of many dairy products through the production of lactic acid, which inhibits the growth of other organisms as well as lowering the pH of the food product. I am best known as a normal inhabitant of the intestinal tract of humans. Although my presence in the human small intestine is generally linked with well-being, it is still a matter for debate whether my presence is the cause of feeling good. It is even less clear whether drinking me and my friends really has a positive influence on human health. Are we supplied in sufficient numbers to survive a trip through the stomach?

Employment:

Lots of studies have been done on the effects of probiotics on health (see referee 3). The list of areas studied includes: hypertension; colo-rectal cancer; immune system stimulation; vaginitis; diarrhoea; antibiotic-associated diarrhoea; Travellers' Diarrhoea; rotavirus infections; small bowel bacterial overgrowth; lactose intolerance; hypocholesterolemia; urinary tract infections in women; miscellaneous cancer; antimutagenicity; and septicemia.

Referees

■ 1 Gilliland SE, Speck ML and Morgan CG. Detection of *L. acidophilus* in faeces of humans, pigs and chickens. *Appl. Microbiol.* (1975) **30:**541-545.

■ 2 Altermann E, Russell W M, Azcarate-Peril M A, Barrangou R, Buck B L, McAuliffe O, Souther N, Dobson A, Duong T, Callanan M, Lick S, Hamrick A, Cano R, Klaenhammer T R. Complete genome sequence of the probiotic lactic acid bacterium *Lactobacillus acidophilus* NCFM. *Proc Natl Acad Sci* U S A. 2005 **102**(11):3906-12.

■ 3 Sanders MA and Klaenhammer T R. The scientific basis of *Lactobacillus acidophilus* NCFM functionality as a probiotic. *J Dairy Sci.* (2001) **84:**319-331.

■ 4 where sequenced: http://www.calpoly.edu/~rcano/Lacto_genome.html

Endangered Culture Collection Fund Report

Saving a Valuable Bio-resource in Chiang Mai, Northern Thailand

Chiang Mai is the second largest province in Thailand after Bangkok. The province is located in the northern part of the country. The population of Chiang Mai city is about two million. Chiang Mai University is a relatively new university and was established in 1965; the Faculty of Science being one of the seven faculties formed at that time. Now 13 Faculties exist. The Faculty of Science has eight Departments including Biology, Chemistry, Computer Science, Geology, Mathematics, Physics, and Statistics. Within the Department of Biology three basic degree programmes are taught specializing in Biology; Microbiology, Microbial technology, Biodiversity and Botany. The Biology department has 200 undergraduate students, 40 post-graduate students and 60 staff members. Each year 2000 students graduate from Chiang Mai University, most coming from northern region of Thailand.

The keen and ongoing interest in microbiology within the University has resulted in a modestly sized but unique collection of micro-organisms being built up representing a wide spectrum of biota from this part of the world. Within the Applied Microbiology Unit in the Department of Biology, Chiang Mai University, there exists a collection of some 2000 strains of bacteria, actinomycetes, yeasts and filamentous fungi.

However, due to the current limitation of resources and in particular, preservation facilities, much of the collection which is of importance both as a local teaching tool and to the Thai network of culture collections, was in danger of being lost. We were therefore extremely grateful, having applied to the Society for Applied Microbiology (SfAM) **Endangered Culture Collections Fund**, to secure a grant to enable our precious resource to be placed on a sounder footing, at least for the medium term. Strains maintained in our University culture collection are used in our undergraduate and post-graduate teaching and some may have commercial potential.

Current practice within the Chiang Mai culture collection is to preserve strains by active sub-culture, under mineral oil, and/or frozen at -20°C. The collection is not fully characterized but is thought to contain many new taxa and novel isolates obtained from soils and plant materials of the region and other regions and unique habitats throughout Thailand. We also have an old freeze drier but lack the expertise to operate it efficiently. Consequently the opportunity to have Dr Peter Green from the National Collection of Industrial, Food and Marine Bacteria (NCIMB) culture collection in the UK to come and visit and advise on optimal preservation methods and to supply funds to enable the collection to continue was of immense value. This important biological resource is very important for research and development in our country. As we are a developing country most of our technology is originally bought in from developed countries, a process which involves a lot of money, but the local people do not improve any of their skills by this route alone. Thailand is a tropical country and a good resource for a diverse range of potentially valuable microbes which may be important in the discovery of new bioactive compounds. If we can maintain this resource until we are in a position to fully study and exploit their potential, this will be of immense benefit to the Thai community. Maintaining this culture collection will allow us to find out if any of the micro biota within the Chiang Mai collection harbor useful compounds that can be used not only in Thailand, but throughout the rest of the world.

The SfAM grant will be spent on a laboratory freezer, a dehumidifier, a small liquid nitrogen tank, glass ampoules for freeze drying culture, cryovials and culture media.

In summary, we found it extremely valuable for Dr. Peter Green to visit and help explain the various methods available to preserve our endangered strains. His lecture during the visit gave us useful methodologies for students and staff to employ in our laboratory making optimal use of the limited facilities available. We can improve our laboratory techniques and hope we can collaborate in other research projects given the safeguarding of our resource. We also made use of Dr Green's visit to highlight the value of the culture collection to senior administrators within the university and to lobby for improved support in the future.

Further Information

■ For more information about the Society's grants and awards, visit: www.sfam.org.uk/members/prizes.php

Dr Saisamorn Lumyong
Department of Biology, Faculty of Science, Chiang Mai University, Thailand

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

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

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

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

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

7. Under exceptional circumstances this maximum may be exceeded.

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

10. The applicant must write a short article of between 400 - 600 words within 4 weeks of the meeting, the content of which will be agreed with the Editor of sfam *Microbiologist* and will be published in the magazine. Photographs of the applicant and/or the subject of the article are desirable. These should be supplied as (a) digital files in TIFF or JPEG format at a size of not less than 4 inches square at a resolution of not less than 300 pixels per inch, or (b) original photographic prints which will be scanned and promptly returned to the applicant.

The terrestrial fate of *Cryptosporidium* in drinking water catchments

THE PROTOZOAN PARASITE *Cryptosporidium parvum* is a major cause of waterborne illness in humans and domestic livestock such as cattle, sheep, and pigs. Although cryptosporidiosis is mainly confined to young animals, low-level asymptomatic infections have been reported in post-weaned and adult cattle, and in post-parturient sheep. There is evidence which suggests that the transmissive form of the organism, the oocyst, frequently finds its way from animal faecal deposits to surface waters via runoff from land grazed by livestock (Atherholt *et al.*, 1998).

Over the years, a reasonable understanding of the overland transport of sediment and nutrients during rainfall events has been acquired. However, the same cannot be said for the transport of pathogens such as *Cryptosporidium*, knowledge of which has suffered from a lack of quantitative field-relevant data. This is primarily due to difficulties associated with its detection and enumeration. Given that some genotypes excreted by livestock are also infective for humans, and that surface waters may be used as drinking water supplies, quantification of the overland transport of *Cryptosporidium* from animal faecal deposits would provide extremely useful information.

Most previous attempts to model pathogen fate and transport in catchments have relied heavily on assumptions. With this in mind, a collaborative project between the American Water Works Association Research Foundation and its Australian equivalent, the Cooperative Research Centre for Water Quality and Treatment, was set up in 2001, involving researchers from organisations in Australia and The Netherlands. The objective of this project was to address the lack of quantitative data regarding the terrestrial fate and transport of surface water pathogens, and specifically *Cryptosporidium*.

Drinking water supply catchments within Australia may be protected (from which all agricultural activities and development are excluded), semi-protected (some activities are allowed but there are also excluded areas), or non-protected (may support a range of activities and developments). The range of potential pathogens sources will obviously be wider in non-protected catchments and may include discharges from Sewage Treatment Plants and septic treatment systems. All three catchment types may receive pathogen inputs from animal faeces since even in the protected catchments, surface waters are accessible by wildlife.

Field-scale rainfall simulation experiments

Data was collected from experiments and carried out at a range of scales. Typical total and viable *Cryptosporidium* oocyst concentrations shed in faeces by adult and juvenile livestock and kangaroos (the latter contributing the largest biomass of faeces to Australian catchments from native animals) were determined over an 18-month period for an Australian drinking water supply catchment. At laboratory scale, microcosms were used to determine inactivation rates for *Cryptosporidium* in soil and in cattle faeces when exposed to different temperatures, moistures and biotic status (Davies *et al.*, 2005).

With the aid of particle size analysis, studies were carried out to determine if *Cryptosporidium* is most likely to be transported in runoff as aggregates or as single oocysts, an important consideration when modelling pathogen transport, since oocysts that are aggregated to each other or to soil/faecal particles would not be likely to be transported as far. The release of oocysts from standardised, inoculated

cow pats and their transport over one metre across the surface of intact soil blocks was determined under simulated rainfall events. These laboratory-scale experiments allowed initial oocyst release and transport to be quantified at different slopes, under different event characteristics (duration and intensity), as well as on bare and vegetated soil surfaces (Davies *et al.*, 2005). Finally, field-scale rainfall simulation experiments on soil plots enabled ground-truthing of the observations made at laboratory scale.

In recent years, there has been an increasing focus on catchment management as a fundamental requirement to reducing the risk of drinking water contamination. By narrowing the knowledge gaps that exist with regard to quantification of transport and environmental inactivation of key pathogens, better prediction of source water quality may be achieved. This will enable factors that govern pathogen transport in catchment environments to be better managed.

An award from The President's Fund, and funds from the CRC for Water Quality and Treatment are gratefully acknowledged, and enabled this work to be presented in a special session on pathogens in catchments at the American Water Works Association Water Quality Technology Conference in San Antonio, Texas, November 2004.

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Cheryl Davies

Could you benefit from this Grant?

Exploring *Listeria's* gut feelings

IN 1999 THE UNITED STATES Centres for Disease Control and Prevention (CDC) estimated that on an annual basis *Listeria monocytogenes* accounts for 27.6% of the total deaths caused by known bacterial food-borne pathogens, which corresponds to 38.5% of all deaths caused by these food-borne pathogens in the U S. As a food-borne pathogen the most common route of infection is *via* ingestion of contaminated food. Once ingested the bacterium passes through the stomach before entering the upper small intestine, where it adheres to and eventually traverses the intestinal tract wall. Once in the intraperitoneal cavity it is phagocytosed by infiltrating macrophages which subsequently transfer the bacterium to the internal organs, primarily the liver and spleen of the infected host.

While listeriosis usually presents as a systemic disease, with mild flu-like illness and mortality rate of 20-30% among susceptible individuals (generally the young, old, pregnant and immunocompromised), there is increasing evidence to suggest that *Listeria monocytogenes* is also a significant cause of gastroenteritis, in the absence of severe invasive disease and mortality. A recent outbreak of *L. monocytogenes* gastroenteritis, associated with the consumption of contaminated corn in northern Italy, involved 1,566 otherwise healthy individuals with symptoms ranging from diarrhoea, nausea, vomiting, abdominal cramps and fever, yet little evidence of invasive disease and no fatalities (Aureli *et al.*, 2000).

During the gastrointestinal phase of infection *Listeria* encounter a variety of environmental insults, including the low pH of the stomach and the elevated osmolarity and bile salts of the upper small intestine. To overcome these stresses *L. monocytogenes* has evolved a number of complex stress management strategies; including systems for regulating pH homeostasis (thus facilitating gastric transit, reviewed by Hill *et al.*, 2001) and, the focus of the current article, osmoprotectant uptake and bile resistance mechanisms, which assist intestinal persistence.

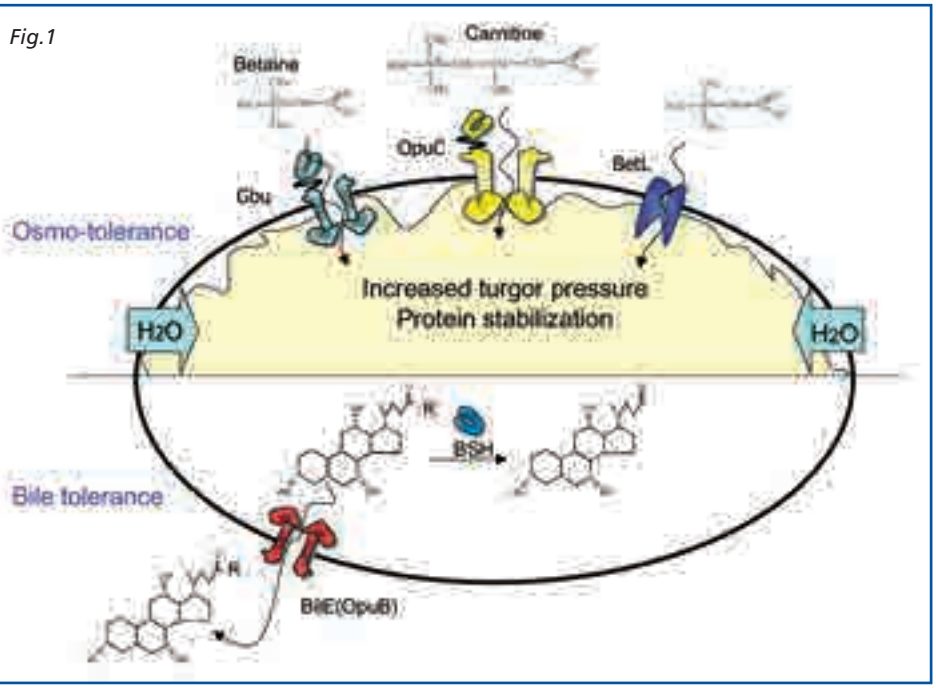
With an osmolarity equivalent to 0.3M NaCl, the upper small intestine represents an osmotically stressful environment. To prevent water loss from the cell and plasmolysis, bacteria accumulate a restricted range of low molecular weight molecules termed osmolytes or compatible solutes (Sleator and Hill, 2002). The preferred compatible solutes for the majority of bacteria and the most effective osmolytes in *L. monocytogenes* are the trimethyl ammonium compounds glycine betaine (occurring at high concentrations in plant cells) and carnitine (associated primarily with animal tissues). There are three compatible solute transporters in *L. monocytogenes*; two betaine uptake systems (Gbu and BetL) and one carnitine transporter (OpuC) (Fig. 1). Significantly all three systems are co-ordinately regulated by the alternative stress sigma factor σ^B (Sleator *et al.*, 2003).

The apparent redundancy of multiple transporters may be explained by the biphasic lifestyle of *L. monocytogenes*: exposed on the one hand to the fluctuating climatic conditions of the external environment (such as experienced in soil and vegetation, where betaine is the primary compatible solute), and subsequently within the animal host (where carnitine is most likely the predominant osmolyte).

The individual contribution of each transporter is thus dependent on the immediate surroundings, creating a situation whereby each system is tailored for optimal effects within a specific environmental niche. When the niche in question is the upper small intestine, OpuC appears to plays the critical role (Sleator *et al.*, 2001).

Following publication of the *L. monocytogenes* genome, in silico analysis revealed a fourth putative osmolyte uptake system which at the time was designated OpuB (for Omsoprotectant Uptake). As with the other compatible solute uptake systems, OpuB is part of the σ^B regulon and as such is significantly upregulated at elevated osmolarities (Sleator *et al.*, 2003). However, the system failed to transport any of the known compatible solutes or offer any osmoprotective advantage to *Listeria*, thus prompting the question "what is OpuB and what does it do?"

Fig.1



Computer-aided structural analysis revealed the presence of two ATP-dependent bile acid permease signature sequences, suggesting a possible role for OpuB in listerial bile tolerance. This hypothesis was confirmed by the construction of an *opuB* deletion mutant which is ~100,000 times more sensitive to physiological concentrations of human bile than the parent wild type strain. Radiolabelled bile accumulation studies revealed that, since the mutant contained approximately twice as much radiolabelled bile as the wild type, OpuB most likely functions as a bile exclusion system, thus prompting us to rename the system BilE (for **Bil**e **E**xclusion: Sleator *et al.*, 2005). Perhaps the most significant feature of BilE is its role in listerial pathogenesis. Co-ordinately regulated by σ^B and PrfA (the master regulator of virulence potential in *L. monocytogenes*), BilE is absolutely required for successful infection following oral inoculation (Sleator *et al.*, 2005).

In addition to BilE, the availability of the complete genome sequence of *L. monocytogenes* has facilitated the identification of additional loci involved in gastrointestinal persistence, principal among them are genes involves in bile detoxification. Three genes in particular: *bsh*, *pva* and *btlB* (which are all absent from the non-pathogenic strain *L. innocua*) were suggested, based on homology, to play an important role in listerial bile tolerance. The first gene, *bsh*, encodes a bile salt hydrolase (BSH) which catalyses the first step in bile detoxification. The remaining systems (*pva* and *btlB*) although not involved in bile hydrolysis nonetheless exhibit a bile sensitive phenotype which is comparable to the Δbsh mutant. In addition for both *bsh* and *btlB* the bile sensitive phenotype translates to a significant reduction in murine faecal carriage and liver and spleen colonisation (Begley *et al.*, 2005).

Interestingly, the majority of gene systems implicated in listerial intestinal persistence are co-ordinately regulated by both σ^B and PrfA. This, coupled with the fact that PrfA expression is regulated by σ^B, suggests that stimulation of the σ^B regulon in the upper small intestine may not only facilitate successful gastrointestinal transit but also functions to prime the pathogen for the next phase of infection which, in susceptible individuals, is systemic disease.

The main tenets of this article were presented as a lecture at the 15th European Congress of Clinical Microbiology and Infectious Diseases, Copenhagen, April 2005. Attendance at the conference was assisted by a very generous President's Fund Grant for which I am extremely grateful.

Roy Sleator
Department of Microbiology & Alimentary Pharmabiotic Centre, University College, Cork, Ireland

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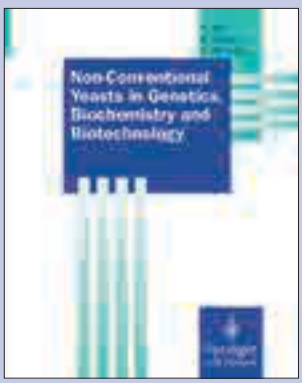

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Emerging Infections 6

Edited by: W Michael Scheld, Barbara E Murray, James M Hughes
ASM Press 2004. ISBN 1-55581-242-2
Reviewed by: Carol A Phillips

This text is based on an ICAAC Symposium on Emerging Infections and is targeted at a specialist, rather than the general audience. It would be particularly useful for postgraduates and academics researching in the field of emerging infections including those working in microbiology, public health, medicine and infectious diseases. The source of the information presented within the book, ensures it is relevant, up-to-date and based on current research in the areas covered.

The book focuses on a number of infections currently causing major challenges for the public health services worldwide. These include both newly described infections and new aspects of well known infections previously considered under control by clinical and laboratory scientists as well as by those involved in public health.

Each chapter is written to the informed audience and is based on research in the topic area addressed by respected authors in the field. As such the tables and figures are excellently presented and the number of references at the end of each chapter indicates the wealth of information presented in this book. The first five chapters cover (re)emerging viral infections with interesting chapters on a little discussed topic of vaccine-derived outbreaks such as those of polio and yellow fever. The chapters on HIV infections and the global AIDS epidemic should be read by all those interested in this topic area and provide some sobering reading to those not up-to-date with the world -wide situation.

The book also includes a number of lesser-known public health problems, which may have limited relevance to some readers. Following the chapters on viral infections, enteroaggregative *Escherichia coli*, travel associated fungal infections, human African Trypanosomiasis and racoon roundworm infection (Baylisascariasis) are all covered in some depth, giving very well-written overviews and providing excellent reference lists for further reading.

As such this book could be used by final year undergraduates as a reference text for these topics.

Surveillance is the subject of the last two chapters. There is a thought-provoking chapter discussing whether surveillance for unexplained deaths be used as a public health approach for early recognition of new pathogens which presents evidence from the population-based project the Surveillance for Unexplained Deaths and Critical Illnesses due to Possible Infectious Causes Project (UNEX) at four Emerging Infection Programme (EIP) sites in the USA. Experience from this project suggests that active surveillance could identify emerging infections but this approach requires a number of disparate organisations to work together in a cohesive way in order to signal up issues that need to be addressed in the future by clinical scientists, the medical profession and public health authorities. As is described in the final chapter, the International Emerging Infections Program is one way, and probably the only one, that will provide the mechanism whereby potential global emerging infections will be identified quickly, therefore allowing effective preventative measures to be put in place.

Overall this book is value for money. Although some of the topics covered are rather less well known and rather an eclectic mix, it is not for the lay reader or non-specialist. However, it does cover topics not normally discussed in more generalised texts on emerging infections so providing a very good overview of these issues. It is an essential book for the research library or bookshelf for those involved in the emerging infections research field.

The Innate Immune Response to Infection

Edited by Stefan H E Kaufmann, Ruslan Medzhitov & Siamon Gordon
ASM Press, Washington D.C. 2004
ISBN 1-55581-291-0
Reviewed by Clare M Taylor

There are almost as many books on immunity and/or immunology as there are facets of the immune response itself and I have found it difficult on occasion to find a single text that adequately describes particular aspects such as natural immunity. However, in this latest text from ASM Press, the innate immune response is dealt with solely and comprehensively. The list of contributors is impressive with experts active in their respective fields describing current concepts and ideas. In addition, the editors have taken care to ensure that the subject is covered in sufficient depth to justify the price, which at $116 (around £65) is not insignificant.

This book has come at a time when the editors suggest innate immunity is re-emerging at the "center stage of immunology" and reviews topics in terms of modern cellular and molecular biology. The book begins with a thoughtful chapter on evolutionary aspects, which considers emergence and phylogenetic distribution of innate and adaptive immunity, while describing interactions between the two. This is followed by a chapter describing recent developments in insect immunity, concentrating on Drosophila, before subsequent chapters are grouped under the headings of "Mammalian Cells", "Humoral Factors", "Receptors" and "Effector Responses." In this way, the text deals with major concepts in a logical manner. I particularly like the section on mammalian cells with each individual chapter dedicated to a particular cell type; neutrophils, macrophages, dendritic cells, mast cells and basophils as well as natural killer cells are all described. Finally in this section, the role of epithelial cells in directing the recruitment of other immune effectors are considered in a chapter that describes the urinary tract as a model for innate mucosal immunity and followed by a chapter on Paneth cells and intestinal inflammation.

The remaining chapters (too many to list here) include "Toll-Like Receptors: Ligands and Signalling," "Coagulation and Innate Immunity," "Reactive Oxygen and Reactive Nitrogen Metabolites as Effector Molecules Against infectious Pathogens" and a final well-placed "Role of Innate Immunity in Bacterial Infection." Overall, I think this is a well-put together text with a timely review of each of the topics. One important aspect is that innate immunity is related to various situations, including bacterial, viral, fungal and parasitic infection. The text is complemented with appropriate tables and figures, and includes a section of colour plates. I enjoyed reviewing this book enormously, but a certain amount of immunological knowledge is required as topics are covered in depth. However, at twenty-two well-written chapters, this text should be a welcome addition to any Microbiologist's bookshelf.

Aging, Immunity and Infection

Joseph F Albright and Julia W Albright
Humana press. ISBN 0-89603-644-8
Reviewed by Stephen Percival

Aging, Immunity and Infection makes a good attempt at illustrating the ageing process and critically reviews the major features and functions of the immunue system, known to be significantly altered by aging. This book is very informative and offers immunologists, geriatricians and infectious disease specialists an informative text on the effects of aging on the immune system. The text is well written, well laid out and contains numerous table and figures although additional figures and tables might assist in improving the text further. With the comprehensive list of references available this book constitutes an excellent starting point for researchers in this field.

Chapter one looks at human aging past and present with a clear focus on the demographics and theories of immunosenescence. Chapter two highlights the gradual breakdown of resistance to infection in the aged with an emphasis on common bacterial infections of aging humans, bacterial interactions with mucosal surfaces and viral/fungal infections in aging subjects. Chapter 3 encompasses senescence of the natural/innate resistance of infection highlighting areas such as phagoctyic cells and microbial evasion of phagocytic destruction. Chapter 4 looks at the Aging of Adaptive/Acquired Immunity and includes the aging of the thymus and thymus derived T cells to the functions and diversity of peripheral T cells. The final chapter, chapter 5, considers nutrition, longevity and integrity of the immune system and the evaluation of such provocative ideas as lifespan extension and nutritional intervention to delay immunosenescence. A clear selling point of this book is that it occupies a niche which is not covered by many other texts, however it would benefit from the

inclusion of more microbiology.

This book offers the reader a simple but comprehensive overview of aging and immunity. I would advise that the reader has some prior knowledge of immunology to fully utilise and comprehend the information in this text.

Overall this is a well written book and also provides a good review of host-pathogen interactions. A good addition to any academic library.

Guideline No 45, Manual of Hygiene methods for the Food and Drink Industry

J. Holah and K. Hall
Campden & Chorleywood Food Research Association Group 2003
ISBN: 0 905942 70 1
Guideline 45 alone: £80 for members / £120 for non-members
Guideline 45 including loose-leaf copy of Guideline No 20 - *Effective Microbiological Sampling of Food Processing Environments:* £100 for members / £150 for non-members
Reviewed by Thomas Bintsis

This manual, published in 2003 and prepared by a working party of food industry hygiene specialists, provides a set of standardized methods of taking environmental samples for hygiene testing. It is intended to be used by suitably trained and qualified staff, which have experience in all aspects of practical microbiology and hygiene, including safety. It is not a preliminary hygiene manual, as one might expect from the title.

Following a brief introduction of general guidelines to hygiene methods, the manual consists of six groups of methods (surface sampling and assessment, air sampling, personnel, process water, packaging and verification). In each group there are a number of different methods covering each subject area.

Group 1 describes methods for surface sampling and assessment; there are five methods for swabbing small surfaces and one method for swabbing medium and large surface area. It also contains the description of contact plates method and surface rinsing. In addition, Group 1 discusses results calculations, giving very comprehensive examples as well as, training tips. Throughout, there are 14 excellent black and white illustrations which provide an improved presentation of the subject.

Group 2 describes three methods for air sampling, namely, passive air sampling - sedimentation plates, active air sampling - impaction samplers and filtration samples.

Group 3 considers methods for personnel hygiene sampling; it contains an essential introduction discussing the induction and ongoing training, handwashing monitoring and verification, and protective clothing laundry monitoring and verification. Six methods for induction training, two methods for hand swabbing, and one for the assessment of protective clothing microflora following laundry are discussed. Two methods for sampling process water are described in Group 4 and three methods for sampling packaging materials in Group 5.

Group 6 comprises three methods for verification purposes, a section which is usually omitted from hygiene methods. Thus, verification of the non-antimicrobial nature of the sampling method is described, together with verification of the neutralisation capacity of the sampling / transport medium and recovery of target microorganisms.

Throughout the manual, every method (of the 29, in total) is presented in a comprehensive way and includes the title, scope, principle, media, reagents and apparatus, sampling procedure, interpretation of results, controls, references and a flow diagram which is a useful tool in the laboratory.

The manual also contains a Suppliers Appendix, which is useful for anyone seeking more information and/or relevant media, reagents and apparatus.

The Guideline No 45, *Manual of Hygiene methods for the Food and Drink Industry* can be provided with a loose-leaf appendix containing the *Guideline No 20 - Effective Microbiological Sampling of Food Processing Environments* in the same ring-binder. The latter Guideline, published in 1999, is provided separately in its original bound format, and describes both microbiological sampling techniques and potential routes of food contamination, sampling strategies and sampling methods, sample transport and processing, interpretation of results and all relevant references. It also includes examples of environmental microbiological sampling plans for four commodities (sliced ham, milk, smoked salmon and biscuit).

In summary, the manual is an essential tool for anyone who wants to improve the analysis and control of potential environmental sources, with standardized protocols. It is presented in a ring-binder, so that any page can be removed and replaced easily, and the flow diagrams are incredibly useful.

I highly recommend this manual for anyone involved in Quality Assurance (QA), namely technical managers, laboratory managers, QA managers, HACCP teams and consultants. The manual should be of use to laboratories seeking accreditation to ISO/IEC 17025:1999, and many of the methods described in the manual have been used for many years and their status has been recognized as 'industry norms'. The price of £120 for non-members for the Guideline No 45 alone or £150 with Guideline No 20 is rather high for individual private libraries, but I think that it represents good value for money for any laboratory working on hygiene and environmental analyses.

Public Health Microbiology Methods and Protocols

Spencer, John F T & Alicia L Ragout de Spencer. Humana Press
ISBN No. 1588291170
Reviewed by Efstathios S Giotis

This book is a part of the series *Methods in Molecular Biology*. It is a collection of fifty-two papers/chapters of expert researchers describing, from a practical point of view, laboratory methods of the identification of organisms that can present a hazard to human health. The topics presented cover an extensive range of interesting areas and provide information on readily reproducible and state-of-the-art techniques.

This textbook is divided into eight parts namely bacteria, viruses, fungi and other pathogens, bacteriocins and other inhibitors, in vivo studies in mice, special methods and reviews.

Each part is subdivided to three to fourteen chapters each. Each chapter begins with an introduction explaining the theoretical background of the technique followed by a list of materials used, a step-by-step description of the method and finally useful notes and tips on troubleshooting and common problems encountered in the laboratory.

In the first section, the editors give special attention to methods for detecting genes resistant to tetracycline, antimicrobial resistance in *Salmonella* and identifying and typing *Campylobacter*. In the next section, issues such as detection and molecular genotyping of a variety of viruses are considered. The chapter on Fungi features topics, such as the computerised analysis and typing of fungal isolates, the isolation and enumeration of fungi in foods and the determination of aflatoxin and zearalenone. A range of other types of pathogen are examined including amoebae, fungal conidia and yeasts.

The following section focuses on the use and production of bacteriocins by such organisms as lactobacilli and bifidobacteria including a chapter on the microbiological analysis of cosmetics and hazard analysis and the critical control point system. The use of mice in the study of pathogens and special methods on lactic acid bacteria are also covered. In the final sections there are review articles on the microflora of the gastrointestinal tract, the public health implications from the spread of the pathogens from livestock and poultry production and the molecular aspect of disease pathogenesis in the transmissible spongiform encephalopathies. Methods described include Polymerase Chain Reaction, Pulsed-Field Gel Electrophoresis and Agarose Gel Electrophoresis, Flow Cytometry and many more.

Although diverse and fairly lengthy, this textbook is well organised. Papers are short, succinct, practical and of a high scientific quality. Comprehensive reference lists are also provided at the end of each chapter to give the reader further information. The book is organized in such a way as to keep the related topics together, thus it is easy to find information and each chapter can be read independently.

There are a considerable amount of useful figures and tables in both black and white and colour. At the end of the book there is a subject index, a very convenient tool for the reader who requires information on a topic of interest.

Unlike other similar publications, the methods described in this book are presented in detail and in a simple way. However, the reader is required to have some prior knowledge of molecular biology techniques. This edition would be an excellent addition to any researchers' collection and should also be viewed as an outstanding reference or as teaching text for postgraduate students in the biological and public health disciplines.

Genomics of GC-Rich Gram-Positive Bacteria

Edited by Antoine Danchin
Caister Academic Press 2002
ISBN 0-9542464-3-8. £75.00
Reviewed by Russ Grant

This book is volume two of a series (the Functional Genomics Series) concerning modern genomics and their scientific importance and research. The other titles are 'Genomic Technologies: Present and Future' and 'Frontiers in Computational Genomics'. As the title suggests, this volume deals specifically with GC-rich gram-positive bacteria, focusing almost exclusively on *Rhodococcus*, *Mycobacteria* and *Streptomyces*, probably the most known and studied organisms in the subset. Each chapter follows a set format and is laid out as a scientific paper.

Following David Hopwoods' foreword the first chapter on the evolution of genomes provides a discussion involving politics, the human genome project, the various databanks and metaphors of description. Whilst interesting, there is a slightly one sided view, making more for a personal statement than a critique. The second chapter, on *Rhodococcus* gives a good overview of the genetics, mentioning among other parts the mobile elements and the evolution.

Mycobacterium tuberculosis genetics forms the third chapter with a short but useful case study. Chapter four focuses on the *Streptomyces*, looking closely at the work carried out on *Streptomyces coelicolor* where the whole genome has been sequenced. This includes work on the genes, morphological and metabolic differentiation and functional analysis. The use of the *Mycobacterium leprae* genome analysis in leprosy research comprises chapter five, particularly interesting for its pieces on possible drug targeting. The penultimate chapter then looks at the use of genomics as a tool for identifying secreted proteins in bacteria. The different types of pathways of secreted pathways are detailed (many from gram negative bacteria) and whilst there are no obvious genomic markers for three of these types, the type showing potential markers is explored. The chapter then ends with discussion of the three families of secreted proteins of *Mycobacterium tuberculosis* and the antigen 85 complex. The final paper deals with 'TuberuList', a public web server providing access to a database of the *Mycobacterium tuberculosis* H37Rv genome. The chapter details the sequencing and how the database was made, and gives details of how to use the information system. Figures where used are clear and useful

This text does provide a good contribution to the GC-rich gram positive field, but with seven chapters in 178 pages it seems a little of a loss of opportunity to provide a greater more expanded and encompassing piece of work on the specific area. Its target audience is definitely groups and institutions working on the topic, and the price is very much an indication of this.

At £75 it is likely to only be purchased by organisations heavily involved in the topic. However that said, the information contained in the book, whilst useful, is available elsewhere. In solely value for money terms the book offers little. Much of the information is available elsewhere, particularly from some of the numerous references given which would be easily found using sensible terms in an internet search engine. Being published in 2002, the latest references are interestingly from 2003! However other references do go up to the year of publication.

The excellent referencing is unfortunately let down by the poor index, and another minor gripe is that the website specified for the publishers to look up information regarding the other volumes does not exist, not even as a forward to correct website (at Horizon Press).

To end with, this book could have been better. It serves a specialist purpose and the cost, in conjunction with the content limit it to those working in the specific area at best.

Atomic Force Microscopy

Pier Carlo Braga and Davide Ricci
Human Press (Totowa, New Jersey)
2004. ISBN 1-58829-094-8
Reviewed by Lisa M Avery

Atomic force microscopy (AFM) has many advantages over traditional microscopy in the field of life sciences. Facilitating high resolution at high magnification within minimal sample preparation, AFM also allows the researcher to investigate surfaces while working in real time within an aqueous (or dry) environment. The possibilities for this relatively new technique in biological systems are vast.

This text book targets life-sciences researchers and aims to equip them with practical information on how to use the AFM for a range of applications. The book, volume 242 in the *Methods in Molecular Biology* series, provides a useful insight into the applications of the AFM in biomedical science. Twenty-eight papers cover the basics of this technique and effectively provide case studies of different applications within the biomedical sciences.

The first four chapters cover the basics of how the AFM works, written in a clear and not over-technical manner which is easy for non-AFM experts to follow. Davide Ricci and Pier Carlo Braga author these introductory chapters injecting a lively style into what could otherwise be quite a dry subject area. Chapter 1 introduces the different types of AFM available, touching on different tips and reminding the reader of the importance of purchasing the right piece of equipment for the work they wish to do. Issues such as methods of sample loading and the need to maintain a suitably clean lab area are considered.

Chapter Two leads the reader through imaging methods, distinguishing between static and resonant modes and the subdivisions within each type of operation. A concise and clear description of how force curves are generated is followed up by an explanation of how force curves can provide information on surface adhesion forces which can subsequently be translated into images of local mechanical properties of a sample.

The following chapter is genuinely targeted at the novice and it is refreshing to find a text book which not only highlights some of the pitfalls of AFM and the new types of artifact that come into play with this type of microscopy but actually provides some ideas on how to avoid these problems. The geometry of the probe itself can affect the image generated, as can the scanner, feed back circuit and image processing software, along with vibrational disturbances.

The first three chapters make for no-headaches reading, but the text becomes more complex from the fourth chapter onwards. Here, use of the AFM in biosensing is discussed. The use of the AFM for detecting specific compounds is illustrated with the example of *in-situ* reference and detection of different substances. In this chapter, the authors describe how 'functionalizing' the whole cantilever surface with a layer which is sensitive to the compound to be detected facilitates the use of cantilever arrays as detectors in both static and dynamic modes.

Sections two, three and four supply the reader with 'recipes' for different biomedical applications of the AFM. Section two (morphostructural analyses of cellular structures) includes, amongst others, methods for the analysis of human fibroblasts, corneal tissue and changes in spermatozoa surface properties with maturation.

Section three focuses on sub cellular structures — kicking off with a chapter of notes and tricks. Information like this is an invaluable resource for the novice. Other topics include investigation of protein complexes, living aldosterone-sensitive cells and visualization of bacterial rhodopsin.

Section four highlights some of the functional investigations which can be performed with the AFM — from measurement of mechanical properties of intact endothelial cells in fresh arteries by a nanoindentational technique to observing RNA polymerase activity, building biosensors on the cantilever and investigating single molecular interactions.

Some of the papers in sections 2, 3 and 4 present more of a challenge to the novice and undoubtedly different chapters will hold more or less interest according to the research focus of the reader. My experience was that these sections were hard work to read through in one go, however each chapter provides a full suite of methods with information on sample preparation along with useful notes and tips and is therefore excellent to have on the shelf for reference.

To summarize, this book has much to offer to the life scientist wishing to cross over to the field of atomic force microscopy. The text is relevant and focused and the information appears to be up to date (references cited are generally within the last 5 or so years). The Figures and diagrams are useful and illustrative of techniques or outputs from the AFM. This book must surely provide an excellent contribution to the field of molecular biology. It allows non-AFM experts to gain an understanding of how the AFM could enhance their area of research with useful examples and methodology throughout.

Instant Notes Molecular Biology 2nd Edition

P C Turner, A G McLennan, A D Bates and M R H White. Bios Scientific Publishers Limited. UK 2000
ISBN 1-85996-152-5. £17.99
Reviewed by Russ Grant

I have found the 'Instant Notes' series in the biological field to be very useful as a resource not only to their target audience of undergraduate students but as a quick to hand simple reference for postgraduates. The 'Molecular Biology' book is no exception. I would recommended it to anyone studying or working in the area.

The nineteen chapters cover (in order to give a good indication of its contents): Cells and macromolecules, Protein structure, Properties of nucleic acids, Prokaryotic and eukaryotic chromosome structure, DNA replication, DNA damage, repair and recombination, Gene manipulation, Cloning vectors, Gene libraries and screening, Analysis and uses of cloned DNA, Transcription in prokaryotes, Regulation of transcription in prokaryotes, Transcription in eukaryotes, Regulation of transcription in eukaryotes, RNA processing and RNPs, The genetic code and tRNA, Protein synthesis, Bacteriophages and eukaryotic viruses, Tumour viruses and oncogenes.

This book is the second edition, with the new additions concerned with modern PCR techniques and an expansion of degree level genetics knowledge.

This perhaps illustrates the cross-discipline that molecular biology covers, but in order to get the most from the book knowledge of other areas, particularly genetics and biochemistry, is required.

The book is very easy to read, with excellent cross referencing to other relevant sections. This makes reading up on an area simple and easy to grasp. The level of information is perfect for the style and provides good detail without overburdening the reader. At the beginning of each chapter is a summary of the key points which on its own is very useful. The expanded texts of each point then include well drafted diagrams where appropriate which are self-explanatory. At the end of the material are questions (with answers at the back of the book) which are useful for revision purposes, and a section on further reading laid out for each chapter providing good texts that should be available in any academic library. As this book is aimed at undergraduates, the general nature of its content will date slowly. However the world of molecular biology is fast moving and it will not be long before the book may require updating. This addition is from the year 2000, and whilst techniques such as real time quantitative Polymerase Chain Reaction (PCR) are mentioned they have come along way in five years. However, the information presented is only likely to need adding to rather than amending.

Other similar books are available, which I have found equally as useful, and of course the larger (in size and price) more in depth tomes do provide a greater degree of detail which students may find is needed to fulfil course requirements and assignments. For those working in molecular biology the book may be basic but provides an excellent reference to compliment more appropriate texts.

Instant Notes Molecular Biology is a great book and excellent value of money, well worth having even as an easy to hand reference, it was borrowed by my collegues and I had to get it back to write this review - obviously a good text.

Introduction to Biodeterioration. 2nd Edition

Dennis Allsopp, Kenneth J Seal, Christine C Gaylarde
Cambridge University Press, 2004
ISBN 052-1528-879
Price £19.99 / $34.99
Reviewed by Joy E M Watts.

Biodeterioration is a large and rapidly expanding subject area, with many specialized texts dealing with the breakdown of a specific type of compound. The main aim of this book is to provide a basic introduction and a broad overview of the many areas of biodeterioration for the layperson. The book succeeds in its aim, it is clearly written, quite short (p237) and provides a newcomer with an informative and non-intimidating read.

The first chapter defines biodeterioration and introduces the financial costs of this process. However, its essential role in global nutrient and mineral cycles is also highlighted. The next three chapters all deal with major substrates of biodeterioration; Natural Materials, which includes discussions of foodstuffs, wood, metal, cellulose and leather. Synthetic Products, examining the biodeterioration of paint, adhesives, fuels, glass and plastics and the final topic area of the Built Environment, Structures and Systems discussing buildings, monuments and vehicles.

Each of these chapters discusses common problem areas with many illustrations and practical examples. The microbiology is limited, but this is to keep within the remit of an introductory text. Plenty of further references are provided to allow the reader to obtain further details of the microbes involved. However, the chapters do summarise which microorganisms are commonly implicated in different breakdown reactions. These sections have many pictures and illustrations of biodeterioration in effect but the picture are all black and white, I understand that this is to keep costs down but maybe a link to a webpage containing the colour images could be arranged by the publisher.

The book then moves to investigative biodeterioration, focusing on different methods for the detection of biodeteriogenic microorganisms. This section discusses the audit stage of the investigation, highlighting the difficulties of sampling a large site while often dealing with company representatives. Different sampling strategies are examined for different surfaces and standard microbiological analysis tools such as microscopy and Enzyme-Linked Immunosorbent Assay (ELISA) techniques.

National and International standards in biodeterioration are also discussed with reference to British, European and USA values which is helpful. This new second edition has a review of molecular nucleic acid tools including a good explanation of Polymerase Chain Reaction (PCR), Denaturing Gradient Gel Electrophoresis (DGGE), microarrays, proteomics, Fluorescence *In Situ* Hybridization (FISH) and microsensors techniques and how these can be applied to biodeterioration studies. This section provides a very basic introduction to how these techniques work and how they can be applied. The reference list provides many articles for further reading for each of these molecular methods.

The text concludes with an examination the control of bioremediation with the main focus upon preventative techniques, the book states “an ounce of prevention is better than a pound of cure” in the context of biodeterioration. Different preventative methods are examined including physical and chemical and their regulatory aspects. The chapter finishes with a small but interesting section on biological control methods.

The cover notes suggest that this book would be suitable for “those in industry, commerce and local government who are concerned with the preservation and conservation of a wide range of materials of economic or cultural importance”.

I found this book provides a reasonably priced introduction to this complex area and the References and Further Reading sections at the end of the chapters provide additional sources for those that require additional information.

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

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