Microbiologist

The magazine of the Society for Applied Microbiology ■ June 2008 ■ Vol 9 No 2 ISSN 1479-2699

LICHEN COMPETITION:

two-dimensional warfare in slow motion

INSIDE

excellence in microbiology

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June 2008 ■ Vol 9 No 2 ■ ISSN 1479-2699

Microbiologist the magazine of the Society for Applied Microbiology

contents

members

news

publications

features

meetings

commercial

Summer Conference 2008: full programme

Mycological-botanical contracts

information

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editorial

Lucy Harper talks about competition and collaboration

The main feature articles in this issue of *Microbiologist* contain a similar theme — organisms growing together — although they are conflicting in their message. On the one hand we see an example of competition, where organisms (lichens) are competing for resources in order to survive (page 27). On the other hand we look at the fungi that live in harmony within plants (page 32).

However we choose to look at it, each of the aforementioned scenarios could be seen as natural phenomena which reflect common activity in the scientific research community. Scientists are often competing with one another for resources (e.g. funding) and when promoting their work and their team through publication and professional activity.

Competition is also commonplace in the business world. We often hear about companies competing for customers, suppliers and resources to increase their market share.

Some companies choose to add value through making strategic alliances with other organisations. Perhaps a design company are allied with a printing company to ensure best practice and lower costs? Or companies make alliances through their promotional activities. One notable example of this is where one company allied with another in the promotion of nappies and beer: market research found that these two items were commonly purchased together by customers popping into a supermarket for a small number of items on a Friday evening (strange, but true).

Other companies choose to merge with competing companies such that they move from competition to symbiosis. Done well, this can obviously be beneficial for both organisations as it increases both companies' sizes very quickly and decreases the size of the competition pool. This could be seen as a form of collaboration.

Scientific collaboration is also common and mutually beneficial for all parties and this is the theme of two articles in this issue of *Microbiologist*. The Infectious Diseases Research Network (IDRN) encourage collaboration by assisting scientists in finding suitable collaborating partners (page 35). Also, the EU-funded Network of Excellence, Med-Vet-Net, would like to promote collaboration between scientists of its partner institutes in Europe. Turn to page 18 for more information about their Short Term Mission scientific exchange programme and a similar exchange programme run by EU-US Safefood.

In order to collaborate, scientists first need to contact one another, and with increased availability of online networking tools, this is becoming easier and easier. For those of you have yet to register with any online social networking tools, this issue of *Microbiologist* provides you with a short guide to signing up and logging on to Facebook. S*f*AM have a presence there so see page 12 for details of how you can join the S*f*AM Facebook group and make contact with like-minded people with an interest in all things tiny.

Whether you are in a position of competition or collaboration (or more likely, both), I hope you find useful information in this issue of *Microbiologist* which will help you stay in touch with your fellow scientists world wide

contribute

We are always looking for enthusiastic writers who wish to contribute articles to the magazine on their chosen microbiological subject.

For further information please email the editor, Lucy Harper at: **lucy@sfam.org.uk**

Lucy Harper

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Website: our website **(www.sfam.org.uk)** is a timely source of up-to-date information on all Society matters and maintains a comprehensive archive of articles and reports on a variety of microbiological topics.

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benefits

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

- Access to our four peer-reviewed Journals: *Journal of Applied Microbiology*, *Letters in Applied Microbiology*, *Environmental Microbiology* and *Microbial Biotechnology*
- Free access to the entire collection of digitized back files for *JAM* and *LAM* dating back to 1938
- A topical quarterly magazine, *Microbiologist*
- Substantially reduced rates for attendance at SfAM meetings and conferences
- Networking with worldwide professionals in over 73 countries
- Access to private members area of the SfAM website
- Monthly email bulletins with the latest news from SfAM
- Invitation to the annual Environmental Microbiology Lecture
- Eligibility to nominate a candidate for the new SfAM Communications Award
- Fostering cross disciplinary research
- A 25% discount on the extensive Wiley-Blackwell collection of titles

Detailed information about all these benefits and more can be found on the Society website at: www.sfam.org.uk

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

Full details of all the Society's grants and awards can be found on the website together with PDF downloadable application forms. Please see page 14 to find out which grants are for you.

JOURNALS: The Society publishes two monthly journals: *Journal of Applied Microbiology* and *Letters in Applied Microbiology*. We also produce this quarterly colour magazine, *Microbiologist*, which contains features, topical news stories and full details of our meetings. The Society is also a partner with Blackwell Publishing in the monthly journal *Environmental Microbiology* and we are launching a new journal for 2008; *Microbial Biotechnology.*

Synergy is an online service provided by Blackwell Publishing that gives Full and Student Members FREE access to the online versions of the Society's four journals: *Journal of Applied Microbiology, Letters in Applied Microbiology, Environmental Microbiology* and *Microbial Biotechnology.* Members can register for this service at **http://www.blackwell-synergy.com.** Members can also submit papers directly to our journals via an online submission service. For more information about Synergy or online manuscript submission, please visit the website.

MEETINGS: We hold three annual meetings. The Winter Meeting is a one-day meeting with parallel sessions on topical subjects. The Spring Meeting is a one-day meeting tailored for personnel in clinical microbiology. The Summer Conference is held every July and comprises a main symposium, a poster session, the AGM and a lively social programme. We also hold joint ventures with other organisations on topics of mutual interest.

WEBSITE: The website is the best source of detailed information on the Society and it's many activities. It has fully interactive membership areas where you can find archive issues of *Microbiologist*, other, exclusive SfAM documentation and much more.

membership options

Full ordinary membership gives access to our many grants and awards, online access to the *Journal of Applied Microbiology*, *Letters in Applied Microbiology*, *Environmental Microbiology* and *Microbial Biotechnology* for 2008, copies of *Microbiologist*, preferential registration rates at Society meetings and access to the members areas of the website.

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

Associate membership is only open to those with an interest in applied microbiology without it being a prime aspect of their job. For example, school teachers and those taking a career break; on maternity leave, or working temporarily in other areas. It does not provide access to any journals or Society grants and awards.

Honorary membership of the Society is by election only and this honour is conferred on persons of distinction in the field of applied microbiology. Honorary members have access to our online journals.

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

- Quarter page advertisement in each issue of *Microbiologist* (which can be upgraded to a larger size at discounted rates)
- the opportunity to publish press releases, company news, etc., in each issue of *Microbiologist*
- FREE banner advert on the Society Website with a direct link to your company site.
- Up to three members of company staff attending Society meetings at members' rate (This means a 50% discount on non member registration rate).

Retirement membership is available to Full Members once they have retired from their employment. Retired members are entitled to all the benefits of Full Membership except grants and access to the Society's journals.

JOIN US!

You can apply for membership on, or offline. To apply offline, please contact the Membership Co-ordinator, Julie Wright on **+44 (0)1234 326846**, or email **julie@sfam.org.uk.** Alternatively, write to her at:

The Society for Applied Microbiology, Bedford Heights, Brickhill Drive, Bedford MK41 7PH, UK

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quirky questions

As a challenge to our members, this issue sees the launch of a new regular column in the *Microbiologist* where we ask some off-the-wall microbiology-related questions and it's up to you to provide the answers.

This issues questions are:

1. Where / when / how did the Biohazard sign originate?

2. Why are some strains of *Serratia marcescans* inherently red?

3. When and why did the term biocides replace disinfectants?

4. Why, when you see cultures from samples from animal bites, do you often see a pure culture of *Pasteurella multicida*?

If you know the answer to any of these questions or you simply have an opinion about them, then send in your contribution to the Editor at the society office. Remember, it's up to you to provide the content for the next issue, so if you don't respond, the column will be no more. So get your thinking-caps on! Perhaps you have a burning microbiological question that's been 'bugging' you for some time (pardon the pun)? If so, send it in and maybe another member will be able to put you out of your misery.

microbreak

spot the **difference competion winner!**

Congratulations to **Dr Soloman Laleye** who correctly spotted all ten differences in the last issues 'Spot the Difference' competition. The differences are ringed in white on picture 'B' below

president's & ceo's column

Margaret Patterson and **Philip Wheat** explain some important changes taking place at S*f*AM

In this issue of *Microbiologist* the President and Chief Executive Officer decided to write a joint column

We came to this decision because we are reaching a significant change in the history of the Society. As you all know S*f*AM was founded in 1931 by a group of dairy bacteriologists. The present constitution was written in 1984 with a number of minor changes since then to reflect operational matters. The Society has been a registered charity since 1984 and has been primarily run by Trustees, who are strictly not remunerated volunteers.

When the current Chief Executive was appointed in April 2005 one of his immediate objectives was to make a change to the Society from an unincorporated charity, to a charity which was also an incorporated company limited by guarantee. The Honorary President in her column in the September 2006 issue of *Microbiologist* provided answers to some questions from members about the proposed changes.

There were several reasons why the Trustees wished for this process to proceed. Firstly, incorporation was recommended by representatives of the Charity Commission when they held meetings with the Trustees in 2003/2004. Secondly, the existing constitution required a significant review to reflect the current working practices of the Society. Thirdly, as an unincorporated charity the Society could not enter into any contracts in its own name. Instead the individual Trustees (including the Custodian Trustees) had to undertake this role. This meant that they were responsible for meeting the terms and the liabilities of the contract. In the worst case scenario they would be personally liable for losses where the Society had no funds to reimburse its Trustees. In addition to these three main reasons, the unincorporated Society (if it so desired) could not hold title to land in its own name. A company can hold title to property in its own name.

The first stages in the change were achieved at the 2006 S*f*AM Annual General Meeting (AGM) where the membership unanimously voted for the Society to dissolve and become established as a company limited by guarantee, but at the same time retain its charitable status. Since that time we have been working on the required new governing documents which are the Articles and Memorandum of Association. We are delighted to announce that this long process is now nearing completion. The new company was registered with Companies House on 3 January 2008 (Company number 6462427). In addition, Society for Applied Microbiology was entered in the Central Register of Charities by the Charity Commission on 3 March 2008 (Charity number 1123044). The next stage in the process will be to implement the resolution that was passed at the 2006 AGM, this was as follows:

"The Trustees wish for the Society to become a company limited by guarantee whilst still retaining charitable status. In accordance with the current constitution I (as a member of the Society) agree with this action which involves dissolving the present charity and transferring all its assets to the new charitable company"

Provided that there is no final delay we are planning to fully implement this resolution by the end of June 2008. This means that from this date the existing charity will cease to operate and all the assets and indeed liabilities will be transferred to the new company/charity. We will alert all contractors with the Society, as any contracts which are signed under the old charity will cease to be valid after the date of the transfer. These will include leases for the office, employment and supplier contracts. In addition, banking and investment holdings will also be changed. The agreement with the publisher of the Society journals will also need amendment. Once these actions have been implemented we can then start to function as the new company/charity. This will mean that during 2008 we will have two reporting periods for the activities of the Society i.e. January to June for the existing charity and then July to December for the new company/charity. After this year we will then revert back to reporting annually. However, from 2009 we will need to lodge end of year accounts with Companies House as well

as to the Charity Commission. The changes we are proposing to implement have been adopted by colleagues in other learned Societies, for example, Society for General Microbiology and Federation of European Microbiological Societies.

The proposed changes will have no effect on you as an individual member. Your membership will automatically be transferred so no action by you is needed whatsoever. There will be no change to any of the benefits of membership, for example, members will still be able to apply for the various grants and awards on offer. The Trustees have tried to keep the structure of the Executive Committee similar to that of the existing Committee and it must be emphasised that any designated Trustee of the Society will still not be allowed to receive remuneration from the new Society for their services. The Chief Executive Officer will also act as the Company Secretary for the new Society and all members will still be entitled to vote at any AGM or extraordinary general meetings. All members will also be free to nominate anybody they wish to serve on the Executive Committee.

Should you have any further queries or questions about the new company, please do not hesitate to contact Philip Wheat at: pfwheat@sfam.org.uk.

More from the CEO

This report is being prepared just after another very successful Spring meeting at Aston University, Birmingham on 9 April 2008 (a full report can be found on page 20). It was pleasing to note that the meeting was oversubscribed and those who tried to make a late booking were unfortunately disappointed. Over 125 people attended this one day event which included an extensive trade exhibition with 13 exhibitors. The meeting was deemed a great success and planning is already underway for next year's meeting, details of which will appear in future issues of *Microbiologist*.

Once again Officers and the Chief Executive will be representing the Society at a variety of meetings in the USA during 2008. We will be exhibiting at the American Society for Microbiology meeting in Boston 1 - 4 June, the International Food Technology meeting in New Orleans, 29 - 1 July, and finally the International Association of Food Protection meeting in Columbus, 3 - 5 August. If you are proposing to attend any of these meetings please stop by the booth and say hello! Don't forget, if you would like to attend any meeting and do not have any funding, why not apply for help from the President's Fund? This grant was designed to help members attend scientific meetings. The award can be as much as £1000 (approximately US$2000) to help cover all meeting costs: registration, travel, accommodation and subsistence. The main criterion to be eligible is that you have paid at least two membership subscriptions. So why not apply today? Full details of all grants can be found on our website.

As a member you should by now have received your invitation to the first Environmental Microbiology Annual Lecture (full details on page 9, *Microbiologist*, March 2008, Vol 9, No 1). If you have not yet received an invitation and you would like to attend please contact me at pfwheat@sfam.org.uk. The response from members has been very good and a significant number have indicated they will be attending this inaugural evening event in London. A full report of the evening will appear in the December 2008 issue of *Microbiologist*.

A final word from the President

I find it difficult to believe that this will be my last column as President. The last three years seem to have passed by so quickly. I would like to finish by paying tribute to the Officers, Committee, Phil and the office staff for all their support during my time as President. It has been a pleasure to be involved in what I think is a very dynamic and exciting Society. I believe it will continue to evolve and grow and I give my very best wishes to my successor, Professor Geoff Hanlon and hope he enjoys his time in office as much as I have.

Dr Margaret Patterson
President of the Society

Philp Wheat
Chief Executive Officer

information

See the next issue of *Microbiologist* for a full farewell to Dr Patterson and an introduction to our new President

membership matters

Members might be interested in noting that the conference, 'MICROBE 2008', is being hosted in Sheffield at the Hilton Hotel from 26 - 28 September 2008

overview

There will be an extensive trade exhibition currently comprising 38 stands which supply medical microbiology products. As usual, the companies will be promoting current and new technologies. The lecture programme is still being finalised but there will be a range of interesting speakers and topics from early Friday afternoon until late on Sunday morning.

programme

The provisional programme is diverse, including talks on cystic fibrosis, microbiology of the intensive care patient, antimicrobial agents (against viruses, fungi and bacteria), *Toxoplasma, Arbovirus*, *Human Papilloma Virus*, PVL staphylococci, influenza, *Vibrio* infections, GI infections and travel, sepsis and syphilis amongst others.

venue

The Hilton Hotel is ideal for visitors, being located near the main A57 Parkway into Sheffield and a short distance from travel interchanges. Many rooms overlook the canal basin which is frequently full of colourful canal boats. All lectures, trade exhibitions and social arrangements are to be held in the hotel, avoiding the need for travel throughout the day. The hotel has a leisure club, which will be available to delegates.

social activities

Social activities, including visits to the trade exhibition are arranged for the evenings, when there will be opportunity to catch up with friends and acquaintances.

more information

Further details can be obtained from the conference web site at: **www.microbe.org.uk**. This will include a programme of events, the final lectures and speakers and application information. The delegate fee is **only £199.00**, which includes accommodation, meals and full participation in the conference.

society *for* applied sfam microbiology

Photo Competition

Have you taken an outstanding photograph of your beloved bugs? Do you know someone who has and you'd like to see their work in print? Perhaps you've taken a photograph while attending a S*f*AM conference which you think is worthy of reproduction?

Due to popular demand, S*f*AM are running the photography competition again this year. We are looking for twelve eye-catching images to use for our 2009 calendar which we will be giving to all out members as a Christmas gift.

To enter this competition, please send your photographs to the Editor in the form of JPEG files which must be a minimum size of 7 x 7cm at 300dpi (800 x 800 pixels). Alternatively, you can send the original photographs in hard copy to the Society Office and we will return them to you after they have been scanned.

Photographs will appear in one of two categories:

1. Scientific — e.g., a colourful image using bacteria
2. Non-scientific but with a S*f*AM theme e.g., taken at a S*f*AM event

The closing date for entries for this competition is Friday 26 September 2008

Membership Changes

NEW MEMBERS

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

Argentina

F. Sineriz

Austria

A. Farnleitner

Brazil

H. Amorin

Canada

A. Ketabi

Denmark

M. Koningstein

Finland

J. Kusnetsov

Greece

V. Valdramidis

India

A. Chauhan

Ireland

M. Begley; E. Broaders; P. Nobmann

Italy

V. Capozzi

Japan

K. Nakamura

Mexico

F. Tuz-Dzib

Nigeria

O. Agwu; M. B. Arebiyi; E. U. Okinedo; O. D. Teniola

Spain

R. Cordero-Otero

Taiwan

Rr. P D

Thailand

A. Thamchaipenet

United Arab Emirates

M. Hachim

United Kingdom

A. A. Abdelaziz; T. Allen; G. Anderson; K. Bamford; O. A. Banjoko; C. Berry; L. D. Birch; A. J. Brown; S. Brown; B. M. Busbridge; J. Bythell; G. Chaloner; K. Chana; D. Charoenwong; S. R. Clarke; M. Cochrane; S. Copsey; B. A. Daramola; A. B. De Menezes; H. Duxbury; M. Field; A. Free; J. Greenman; L. Hill-King; A. Holloway; M. Hutchison; D. M. Jenkins; M. Jones; V. Kadigama; A. Khan; S. Kirk; R. Leja; A. E. Lindner; R. M. Long; A. Lual; V. Malik; K. Martin; S. McIntyre; A. Mehinto; F. C. Ogbonnia; O. I. Okafor; V. Phoenix ; L. Podracka; A. Prabhakar; S. E. Purnell; S. A. Radford; J. Ransom; S. R. Ravella; D. Reed; M. Reed; D. A. Robbins; K. S. Ross; G. Smith; T. J. Smith; N. Solanki; J. Threlfall; T. Vattakaven; J. Walton; A. J. Weightman; A-M Williams; A Wipat; C. Wright

USA

K. Feris; C. Sinigalliano

CORPORATE

3M Healthcare, UK

LOSSES

The Society was saddened to learn of the death of the following member.

Dr W. R. L. Brown, a retired member who joined the society in 1963. Our sincere condolences go to all family and friends.

Sponsor a new Member and win a £50 Voucher of your choice!

If you feel you could be our next winner for 2008, 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.

facebook

As many of you will know, S*f*AM now has a group on the social networking website, **Facebook**. For those of you who are not familiar with this online community, here is a quick guide to signing up and logging on. This is in no way a comprehensive guide to all the activities available on Facebook, but after reading this article you'll be able to search for all your friends, join groups and eventually be a dab hand at poking, throwing sheep and lil' green patches. Intrigued? Then read on...

Getting started

Figure 1: Login screen

To get started on Facebook, you'll need to visit **www.facebook.com** where you'll be presented with a log-in / sign-up screen. (Figure 1). Here you can fill in your name and contact email address. You will also be asked to create a password which you will need to remember to access the site. You'll be asked to confirm your email address and you'll then receive an email, with a link which you must follow in order to complete your registration.

The confirmation email link will take you to a page which allows you to search Facebook for friends who are listed (Figure 2). You can do this by inserting their email address into the space provided. If you wish, you can skip this step.

Next you are prompted to add some basic details about yourself: your school, university (with years of graduation) and place of employment. Again, you may skip this step.

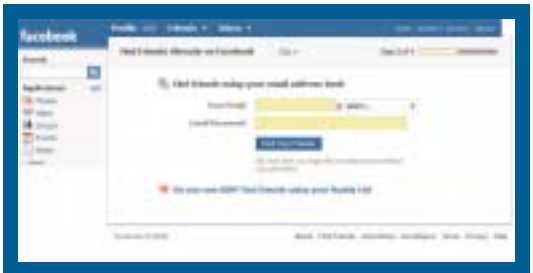


Figure 2: 'Find Friends' screen

The next step prompts you to insert the town or city in which you are based to find a network of people who are also based there. Again, if you don't want to add this information, you don't have to.

You now have a 'profile' (Figure 3) which you can fill out with more detailed information about yourself including your education and employment, your hobbies and interests and any contact details you wish your friends to see. You can also upload a photograph of yourself to allow your friends to find you more easily.

Using the search box at the top left side of most pages in Facebook, you can search for your friends by their email address or simply their name. Once you've found somebody you'd like to be friends with, you can click on 'send friend request' and Facebook will ask them if they'd like to accept your friend request. This means that everyone who is on your friends list is there through reciprocal approval. It is important to note that only your friends will be able to see your profile and then, only to the extent that you let them (see below).

Figure 3: 'Your Profile' screen

Now, you're ready to explore Facebook. At the top of each page are the following links which will allow you to navigate the Facebook site.

Profile: this is all the information you've added about yourself, including your profile image and all recent activity carried out by you.

Edit: here you can edit all the information in your profile.

Friends: this displays lists of your friends who are online now, those with recent status updates (see below), or all of your friends.

Inbox: this allows you to send messages to your friends and view all message threads. It also shows you lists of recent notifications and updates.

Home: this takes you to your home page (described below) which can also be reached by hovering your mouse just the right of the word 'Facebook' on any page and clicking on the small house shape which appears.

Account: this page allows you to change all aspects of your account in detail.

Privacy: this provides you with the facility to set the level of privacy of your account — i.e. who can see what about your Facebook activity.

Logout: unsurprisingly this allows you to log out of Facebook.

What's next?

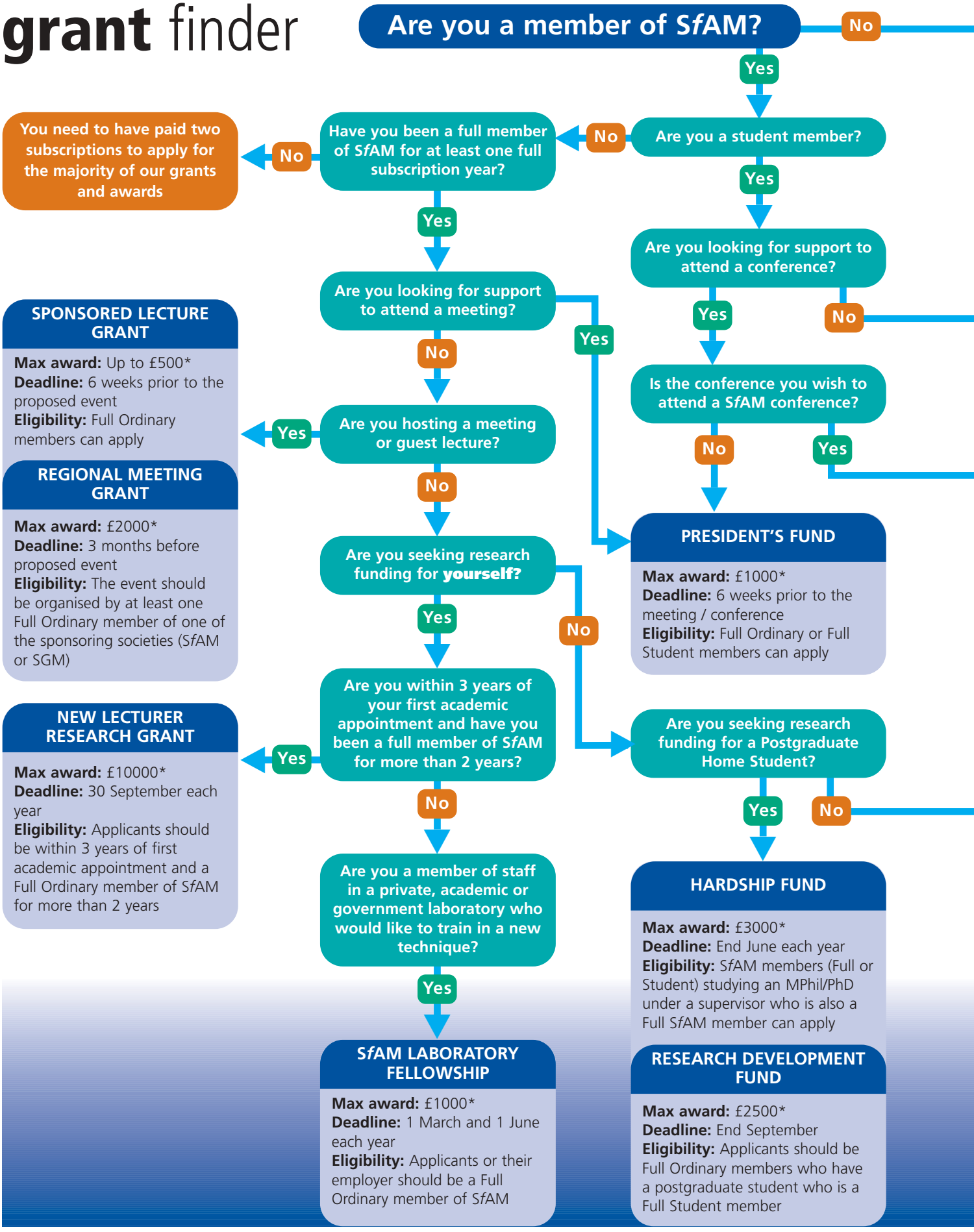
As well as looking for friends using the search box, you can also add search terms to this box and find any individuals or groups with your search term listed in their profile. For example, you might want to search for 'microbiology'. If you do, any groups with this word in their title, or individual users with this word in their profile, will appear in a list and you can then find out more about them simply by clicking on their name or photograph. I am pleased to say that the S*f*AM and Micropod groups are both on the list of results of a search for 'microbiology'.

The 'home' page describes Facebook activities of your friends, networks, events or groups. This is a great way of finding out about groups, networks or events your friends are interested in. This in turn might encourage you to join that group, network or event and if you do join, Facebook will automatically pass this information on to *your* friends via their own home page. Events are associated with groups – for example the S*f*AM meetings are listed as events of the S*f*AM group and each meeting has it's own page on Facebook.

So, there you have it — a short introduction to Facebook. If you've already signed up, then don't forget to join the S*f*AM group to find out more information about S*f*AM and the latest news and events. You can post items yourself including job advertisements or links to other websites, images or videos which you think would be of interest to other members. Or you might want to start a discussion on the 'Discussion Board' or add the photographs that you took while at a S*f*AM meeting? The ways in which Facebook can be used are virtually limitless as long as we have input from members of the group, so sign up, log on and I look forward to 'seeing' you there.

Lucy Harper
Editor *Microbiologist*

grant finder



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Please visit: **www.sfam.org.uk/joinnow.php**
to join online or to download a pdf application form

For detailed information about all our grants and awards and to download a pdf application form please visit: **www.sfam.org.uk/grants.php**

One of the many benefits of S*f*AM membership includes access to the diverse range of grants we provide for our members. Follow the arrows on this chart to answer the questions and find out which grant is for you!

***All grants and awards are available in local currency including $US and €**

You may still be eligible for funding. For more information please contact the S*f*AM office on: +44(0)1234 326661 or email the Membership Co-ordinator, Julie Wright julie@sfam.org.uk

Are you seeking research funding for an Undergraduate Home Student?

Yes

No

CONFERENCE STUDENTSHIPS

Max award: No maximum: reasonable travel and accommodation costs
Deadline: At least 6 weeks before the conference
Eligibility: Full Student members of S*f*AM can apply

STUDENTS INTO WORK GRANT

Max award: £160*per week and up to £500*for specified research costs
Deadline: At least 6 weeks prior to proposed start date of project
Eligibility: Full Ordinary member of S*f*AM can apply

Are you seeking research funding to support an overseas collaboration?

No

Yes

OVERSEAS DEVELOPMENT AWARD

Max award: £5000*
Deadline: At least 3 months prior to visit
Eligibility: Laboratory supporter should have been a Full Ordinary member of S*f*AM for at least 3 years

ENDANGERED CULTURE COLLECTION FUND

Max award: £5000* – usually in a number of smaller awards
Deadline: At least 3 months prior to visit
Eligibility: Applicants should have been a Full Ordinary member of S*f*AM for at least 3 years

Are you seeking funding for an innovative project particularly aimed at public engagement or science communication?

No

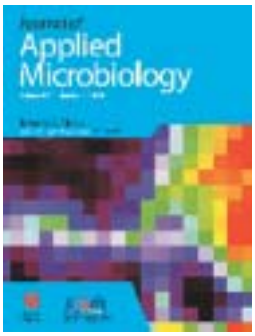
Yes

INNOVATIVE PROJECT GRANT

Max award: £2000*
Deadline: At least 8 weeks before proposed start date
Eligibility: Applicants should be Full Ordinary members with no funding from any additional source

journalWatch

News about the Society's journals



The following articles published in 2008 were the most downloaded articles from Journal of Applied Microbiology between Jan-March 2008:

Novel alternatives to antibiotics: bacteriophages, bacterial cell wall. A. Parisien, B. Allain, J. Zhang, R. Mandeville, C.Q. Lan. **104**, No. 1, January 2008

Bacterial metabolism and health-related effects of galacto-oligosaccharides and other prebiotics. G.T. Macfarlane, H. Steed, S. Macfarlane. **104**, No. 2, February 2008

Microbial contamination of fruit and vegetables and the behaviour of enteropathogens in the phyllosphere: a review. J.C. Heaton, K. Jones. **104**, No. 3, March 2008

A risk assessment approach for fresh fruits J. Bassett, P. McClure. **104**, No. 4, April 2008

Development of a solar-powered microbial fuel cell. Y.K. Cho, T.J. Donohue, I. Tejedor, M.A. Anderson, K.D. McMahon, D.R. Noguera. **104**, No.3, March 2008

The following articles published in 2008 were the most downloaded articles from Letters in Applied Microbiology between Jan-March 2008:

New frontiers in probiotic research. R.D. Sleator, C. Hill. **46**, No. 2, February 2008

Preliminary characterization of exopolysaccharides produced by a marine biofilm-forming bacterium *Pseudoalteromonas ruthenica* (SBT 033). P. Saravanan, S. Jayachandran. **46**, No. 1, January 2008

Evaluation of the PCR method for identification of *Bifidobacterium* species. S.Y. Youn, J.M. Seo, G.E. Ji. **46**, No. 1, January 2008

A new colorimetric microtitre model for the detection of *Staphylococcus aureus* biofilms. K. Tote, D. Vanden Berghe, L. Maes, P. Cos. **46**, No. 2, February 2008

Antimicrobial activity of a multispecies probiotic (Ecologic 641) against pathogens isolated from infected pancreatic necrosis. U. Ridwan, C.J.M. Koning, M.G.H. Besselink, H.M. Timmerman, E.C. Brouwer, J. Verhoef, H.G. Gooszen, L.M.A. Akkermans. **46**, No. 1, January 2008

The following articles published in 2008 were the most downloaded articles from Environmental Microbiology between Jan-March 2008:

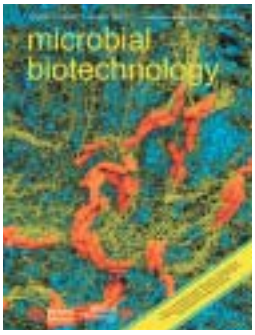
Social bacteria and asocial eukaryotes Michael Y. Galperin. **10**, No. 2, February 2008

Simultaneous analysis of microbial identity and function using NanoSIMS. Tianlun Li, Ting-Di Wu, Laurent Mazeas, Laurent Toffin, Jean-Luc Guerquin-Kern, Gerard Leblon, Theodore Bouchez. **10**, No. 3, March 2008

Microbial diversity — insights from population genetics. Ted H. M. Mes. **10**, No. 1, January 2008

Think big — giant genes in bacteria. Oleg Reva, Burkhard Tummler. **10**, No. 3, March 2008

Cultivation of a thermophilic ammonia oxidizing archaeon synthesizing crenarchaeol. Jose R. de la Torre, Christopher B. Walker, Anitra E. Ingalls, Martin Konneke, David A. Stahl. **10**, No. 3, March 2008



The second issue of *Microbial Biotechnology* is now freely available to read online. Visit: www.blackwell-synergy.com/mbt

Editor's Choice:

Wine Genomics. Roland J. Siezen. **1** Issue 2 Page 97-103, March 2008

Microbial whole-cell arrays. Tal Elad, Jin Hyung Lee, Shimshon Belkin, Man Bock Gu. **1** Issue 2 Page 137-148, March 2008

Internal arsenite bioassay calibration using multiple bioreporter cell lines. Anke Wackwitz, Hauke Harms, Antonis Chatzinotas, Uta Breuer, Christelle Vogne, Jan Roelof van der Meer. **1** Issue 2 Page 149-157, March 2008

For more information about this newly launched journal, visit: www.microbialbiotech.com

***A new benefit for SfAM members — free access to the entire collection of recently digitized backfiles for *Journal of Applied Microbiology* and *Letters in Applied Microbiology* dating back to 1938! To take advantage of this new benefit simply log on to Synergy with your Synergy username and password.**

Lucy Mansfield
Wiley-Blackwell

Science on the Telly

Have you ever wondered where the scientific analysis that is discussed on mainstream TV programmes is actually performed? **Katie Fisher**, a PhD student at Northampton University sheds some light on the world of science on TV

our policy on the media

We will:

- always do our best to provide facts, information and explanation.
- if speculation is required, explain the rationale behind that speculation.
- desist from hyping a story—whether it is the journalist or the scientist doing the hyping.

media**watch**

microbiology in the news

If you have any views on science in the media which you think should feature in this column, please send them to the Editor at: **lucy@sfam.org.uk.**

I have been fortunate enough to work on television programmes such as Channel 4's *How Clean is your House?* and the BBC's *The Late Edition.* Northampton University were contacted by the *How Clean is your House* team to perform the microbiological analyses for the 'science reveal' part of the programme. This included results from a contributor based in Northampton. The producers were impressed with the results and so they approached the University about a longer-term contact. Once I had commenced my PhD studies I was offered the opportunity to lead this project.

I have worked on the show for two series now and have thoroughly enjoyed the whole experience. I have learnt a lot about the world of television and realised that it is not as glamorous as it might seem! The way the show operates is as follows: once the show has found a contributor, the researchers take a good look around the site and evaluate possible areas from which to take samples. After a discussion with myself, these areas are swabbed and the swabs transported to the University for analysis. The samples are then analysed to ascertain which bacteria are present.

Elements of the findings are extremely interesting and one can usually determine patterns within individuals homes. The most rewarding aspect for me is the point at which I contact the producer and ask questions about the lifestyle or area of residence of the contributor — this reinforces my findings and is akin to solving a mystery.

The hardest part of the work is finding an interesting angle from which to present the results, otherwise the 'science reveal' part of the show can become monotonous. Some episodes have included air sampling, the use of an ATP genie and UV light to detect *Pseudomonas fluorescens*. I am present when the 'science reveal' part of the show is filmed, to prevent any inaccuracies in the report and this can mean travelling all over the country.

On arrival I meet with the producer and Aggie MacKenzie (one of the presenters) where we discuss the results and what they mean. At this point Aggie can ask me any questions that she has about the science. The filming of the 'science reveal' part of the show then takes place and can take a couple of hours even though this is condensed down to just a few minutes on the show.

From my work on *How Clean is Your House?* I have been approached by other shows such as *The Late Edition*, a satirical current affairs show. The theme of this piece was related to the number of people who take time off work due to sickness and whether the cause of their illness could be their office.

For this project I was asked to swab the offices at the BBC, analyse the results and then one of the writers of the show, Will Smith, came to Northampton University and was filmed asking me questions about my findings. This was a great experience for me giving me practice in media skills, as I was on the other side of the camera rather than behind the scenes. GMTV have also contacted me regarding the food poisoning outbreaks in the Dominican Republic, however, due to a change in circumstances this project did not go ahead. The fact that I was contacted about this demonstrates how working within this industry can lead to many opportunities.

In my opinion, Microbiology on television and in the media in general enables the subject to be accessed by the general public. In this way I believe it helps in the understanding of cross contamination and hygiene practices associated with bacteria and bacterial infection.

Katie Fisher
University of Northampton

MED•VET•NET

Opportunities for scientific exchanges in Europe for S*f*AM members

EUUS Safe Food

The Society for Applied Microbiology is a partner in both the EU-funded Network of Excellence Med-Vet-Net and the Specific Support Action EUUS-SAFEFOOD. Med-Vet-Net aims to improve research on the prevention and control of zoonoses by integrating veterinary, medical and food science research. Comprising 15 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. EUUS-SAFEFOOD aims to establish a common understanding of the state-of-art knowledge of the microbial ecology, epidemiology, detection, and control and intervention of specific food borne pathogens of joint interest to the EC and US and to, where feasible, initiate areas for joint collaboration in research and surveillance. A list of the Med-Vet-Net partner institutes is available at: **www.medvetnet.org/templates/doc.php?id=17**

The main aim of Med-Vet-Net is to facilitate collaboration between scientists located in many different institutes across Europe, coming from different scientific backgrounds. The common factor they share is the fact that they are working on some aspect of zoonotic disease, whether it is from a public health, veterinary or medical viewpoint.

One successful means of encouraging collaboration has been through the Short Term Mission (STM) scientific exchange programme. The STMs aim to encourage the personal development of scientists by allowing individuals from one partner institute to visit another partner institute for a period of between one week and two months. This visit should benefit both the home institute and the host institute and should contribute to the career development of the visiting scientist.

The visit must be relevant to Med-Vet-Net objectives and can be used to enable training, exchange of scientific data, sharing of strains or testing of samples using specialized equipment. The remit of the visit has now been widened to allow scientists to attend some scientific meetings.

All Med-Vet-Net member institutes can apply for STMs therefore S*f*AM members are eligible. Applicants do not need to participate in a Med-Vet-Net Workpackage but do need to work with zoonotic disease. Med-Vet-Net supports both long and short visits. For longer visits a bench fee to the host institute can be negotiated. The host institute can be another Med-Vet-Net institute, but also visits to non-Med-Vet-Net institutes in Europe can be supported if the visit results in new knowledge gain for Med-Vet-Net. STMs can also be used to invite a European expert to give a seminar or talk within an area relevant to Med-Vet-Net: in this case the seminar should be open to people interested in the subject. Med-Vet-Net STMs cover travel expenses, accommodation and subsistence.

Applicants must follow a specified application procedure and provide a detailed plan of the professional activities expected to take place during the visit, as well as an explanation of relevance to Med-Vet-Net and the visiting scientists career development. The applications should be submitted at least three months prior to the date of the visit.

The application will be assessed by the Med-Vet-Net training committee and all financial arrangements will be made directly with the National Food Institute at the Danish Technical University who administer Workpackage (WP) 2A, the training component of WP2.

Within 30 days of the end of the trip, the fellow must submit to the Med-Vet-Net training committee a detailed report describing the most important achievements and results of the visit, as well as a financial statement.

Find out more

If you are interested in finding out more about applying for a short-term scientific mission with Med-Vet-Net, please contact: Tina Struve, Med-Vet-Net, National Food Institute, Mørkhøj Bygade 19, DK-2860 Søborg, Denmark; Email: tstxx@food.dtu.dk; Tel: +45 72 34 71 03.

Travel grants to visit research laboratories in the US

The Special Support Action (SSA) EUUS-SAFEFOOD provides an opportunity for

med-vet-net

Med-Vet-Net is a European Network of Excellence that aims to improve research on the prevention and control of zoonoses by integrating veterinary, medical and food science research. Comprising 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 five years.

European scientists working in the area of microbial food safety to visit US research laboratories.

The Expert Scientific Exchange programme invites up to 20 European food borne safety scientists from throughout Europe to apply for travel grants to visit research laboratories in the US and Canada in order to ensure technology transfer, and promote collaboration of expertise sharing. The selection of candidates will be based on joint expressed interest between Med-Vet-Net and Food Safety Research and Response Network (FSRRN).

The programme covers the areas:

- epidemiology and risk attribution
- microbial ecology
- detection
- control and intervention.

Application procedure:

1. Identify a laboratory in the US or Canada and make direct contact with an investigator.
2. Discuss the opportunities for cooperative research and training in the field of food safety pre-harvest.
3. Jointly submit an application (please see the application form on the website for more details).

The application should be submitted at least three months prior to the first date of the visit. The duration of an expert scientific exchange visit is not restricted but will normally be 3–14 days. The host institution may be able to provide housing, which would provide the opportunity for the exchange programme to be extended; we strongly encourage applicants to search for such opportunities.

EUUS-SAFEFOOD can cover the costs of travel, boarding and lodging. The visit must be relevant to the EUUS-SAFEFOOD objectives. For more information visit: **http://euus-safefood.com/exchange.htm** or contact: Tine Hald, EUUS-SAFEFOOD, National Food Institute, Mørkhøj Bygade 19, DK-2860 Søborg, Denmark; E-mail: tih@food.dtu.dk; Tel: +45 72 34 70 94.

Tina Struve and Martina Escher

Tina Struve is a veterinarian working for the Danish Zoonosis Centre, a section under the National Food Institute, DTU in Denmark. Tina handles the applications for training courses, workshops and scientific missions in Med-Vet-Net Workpackage 2A — Development of Research Skills and Expertise.

To find out the impact Short Term Scientific Missions have on the visiting scientists, Tina interviewed one of the scientists who had previously been on a mission: Martina Escher is a PhD student from the Istituto Superiore di Sanità, Dipartimento di Sanità Alimentare e Animale Reparto Zoonosi Alimentari ed Epidemiologia Veterinaria, in Italy. Martina went on her Short Term Mission to visit the 1st OIE International Conference *'Use of GIS in Veterinary activities'* for four days in October 2006, arranged by Istituto Zooprofilattico Sperimentale dell' abruzzo e del Molise:

"During the Conference, Geographic Information Systems (GIS) was discussed as a tool for data analysis. The knowledge that could be obtained with geographic-spatiotemporal statistic is particularly suitable for the study of the complex interactions among host, pathogen, vectors and populations that may participate in a zoonotic cycle. Another issue discussed was the implementation of GIS networks, which could represent a useful tool for the exchange of epidemiological information on zoonoses between countries."

The aim of Martina's attendance at the conference was to improve the GIS skills of the ISS group in Med-Vet-Net WP 6. The subjects covered in this conference perfectly reflected the objects of Med-Vet-Net WP 6, and the Short Term Mission has therefore improved the work within WP 6 by exchanging knowledge among the scientists. Martina explained that this mission allowed her to mediate a collaboration between her institute and the institute organizing the workshop *'Istituto Zooprofilattico Sperimentale dell' abruzzo e del Molise'* (TE).

These two institutes are now collaborating on the use of GIS with data collected by both institutes. It is Martina's belief that this exchange of knowledge and collaboration would not have been possible without her Short Term Mission funded by Med-Vet-Net.

Tina Struve

Martina Escher

Teresa Belcher
Communications Director
Med-Vet-Net

information

For more information about Met-Vet-Net, visit:
www.medvetnet.org/
or contact Teresa Belcher on:
+44 (0)1234 271020

Broadening Microbiology Horizons

Spring Meeting 2008 Report

information

For more information about the Society's meetings please visit the website at: www.sfam.org.uk

You can also find details of this years' Summer Conference on page 26 of this issue of *Microbiologist*

The second meeting in the series *'Broadening Microbiology Horizons'* was held on the 9th April at Lakeside Conference Centre, Aston University, Birmingham. Over 120 delegates attended this one day event. The meeting was predominantly targeted at personnel working in clinical microbiology laboratories.

The morning session was opened by Mr Steve Davies (Bacteriology Departmental Manager, Northern General Hospital, Sheffield) who presented the latest developments in the detection and isolation of methicillin resistant *Staphylococcus aureus* (MRSA). Steve highlighted the increase in the incidence of MRSA in the UK during the last decade. He then compared the isolation of *Staph. aureus* from blood cultures in the UK and showed that, in 2002, 44% of these isolates were MRSA. This was compared to 70% in Japan and South Korea but only 1% in the Netherlands. He then discussed the reasons for these differences and described the different culture media that can be used for isolation and detection of MRSA. He highlighted how the relatively new culture media containing chromogens accurately detect MRSA within 24 hours of setting up the culture. In Steve's in-house studies the best results were obtained when cefoxitin (4 mg/l) was also incorporated into the media. He concluded his presentation by discussing non rapid methods for detecting MRSA. Whilst some of the techniques are able to detect MRSA quicker (ranging from 1 to 6 hours of taking the sample) the main disadvantage when compared to conventional methods was that they were considerably more expensive. Further details from this talk can be found in a recent publication (Davies, *et al.*, 2008).

The second presentation of the morning was given by Professor Mike Wren, Consultant Biomedical Scientist, University College Hospital, London. The title of his presentation was 'The fusobacteria and human disease.' Professor Wren commented that most species of fusobacteria were part of the normal flora of the body. He highlighted that good anaerobic transportation of samples to the laboratory was essential for good recovery of fusobacteria. He then explained that isolation rates are significantly and consistently higher from pus samples than samples taken on swabs. Furthermore, it was essential that samples were cultured using good quality culture media, in particular, he identified Fastidious Anaerobic Agar as the gold standard culture media with culture plates being incubated anaerobically for at least 72 hours before being discarded. Professor Wren went on to say that fusobacteria are rarely isolated from blood cultures (occasional isolates are found in leukaemia patients and in patients with Lemmiere's disease) but are commonly found in frontal lobe brain abscesses, neck abscesses, pleural fluids, tissue and bone specimens and samples from the abdominal area. He

highlighted that the species *Fusobacteria nucleatum* was commonly seen in brain abscesses and infections associated with obstetrics. He went on to discuss some of the virulence factors which have been identified from fusobacteria. He completed his presentation by highlighting the isolation of fusobacteria from patients who suffered with recurrent sore throats. He showed data from 267 such patients and from 21% fusobacteria was shown to be the causative agent. All patients responded to treatment with metronidazole.

The penultimate lecture was on 'necrotising fasciitis' and was presented by Professor Gus McGrouther, chair of Plastic and Reconstructive Surgery at the University of Manchester. Professor McGrouther has an active surgical practice at Wythenshawe Hospital, Manchester and he also jointly supervises several fields of tissue repair research relevant to reconstructive surgery. Professor McGrouther described the underlying physiological conditions which result in necrotising fasciitis. He then went on to discuss (using some interesting pictures) the different varieties of necrotising infections. He described seven different varieties which were:

i) post operative

ii) resulting from bites

iii) gas gangrene

iv) necrotising fasciitis as a result of a *Streptococcal pyogenes* infection

v) Fournier's gangrene

vi) Meleney's condition

vii) Noma, which is predominantly found in under-nourished children in the developing world and causes major facial defects.

The final session of a very informative morning was presented by Dr Robert Townsend, Consultant Medical Microbiologist, Northern General Hospital, Sheffield. His intriguing title was 'An infusion of Gram negative bacteria (case study).' With audience participation he described the case of a patient who had been given a significant infusion of blood as an emergency procedure. Subsequently the patient developed a septicaemia which failed to respond to conventional therapy. The blood cultures yielded a culture of *Ralstonia paucula* (CDC group IV C2). This infection eventually responded to meropenem and the patient was sent home after a total hospital stay of 51 days (30 days on intensive care unit). Dr Townsend described the investigations which were used to find the source of the organism - predominantly an organism found in the environment. After extensive investigations it was discovered that the most likely source was from a warm water infuser used for the initial blood transfusion. Dr Townsend highlighted the steps which were now in place to stop a recurrence of this event.

Philip Wheat
Chief Executive Officer

Lunch was then served and delegates were free to browse the extensive trade show which provided a colourful backdrop as people mulled over the contents of the morning presentations.

The afternoon session was chaired by Steve Davies of Sheffield Teaching Hospitals. The first lecture was an update on syphilis presented by Penny Goold, Consultant in Genitourinary Medicine and HIV in Birmingham. The main takeaway message from Penny's talk was that syphilis is back! Penny described how the introduction of Penicillin created a massive decrease in syphilis and the initial impact of the AIDS public health campaign (with accompanying 'Tombstone Advertisements') in the early 1980's helped reduce syphilis prevalence. However,

the fear factor element now appears to have worn off and the disease mainly affects men, especially men that have sex with men (MSM). Penny then highlighted the various outbreaks that have occurred in different regions of England since 1997 where enhanced surveillance data was collected. These were linked to high risk social and sexual networks including various well known social and sex venues for MSM, commercial sex, and 'swingers'. The most worrying aspect was that a significant number of MSM diagnosed with syphilis were co-infected with HIV (up to 38%). Also, contact tracing was shown to detect as few as 10% of contacts, as sufferers are often unwilling or unable to pass on names and addresses. Social venue testing has detected low numbers of positives and publicity campaigns are becoming less effective and difficult to target. West Midlands enhanced surveillance identified that 91% of presenting patients were male, of whom 40% claimed they were heterosexual - so where are the missing women? Penny then went on to describe how primary syphilis although typical in presentation has been frequently misdiagnosed and secondary syphilis the 'great imitator' has created various diagnostic challenges.

Penicillin remains the treatment of choice. Azythromycin should be used with caution as clinical failures have been described and linked to the 'Street 14' mutation. Point of Care Testing and multiplex PCR for genital ulcers *pallidum* are new tools to assist in the diagnosis of this STI and molecular typing of *Treponema* may reveal missing epidemiological clues.

The second talk of the afternoon was given by Dr Val Hall, Technical Head of the UK Anaerobic Reference Unit. She spoke about the value of typing *Clostridium difficile* giving a brief résumé of the methods

available and then concentrating on PCR ribotyping, the main method in use in the UK. Val informed the audience that more than 180 ribotypes exist and she explained that it is much easier to prove that strains are different and hence sporadic, than to confirm an outbreak. Val described which ribotypes are common in the UK and how the highly publicised 027 type was rare until 2004. This strain is indistinguishable from the one that has wreaked havoc in both Canada and USA (otherwise known as BI/NAP1). It has also reached other European countries and was prevalent in the Stoke Mandeville outbreak (2005), which made national headlines. Mandatory surveillance was introduced (in England) in 2005. Approximately 1000 isolates per year (2% of cases) are sent for ribotyping and minimum inhibitory concentration (MIC) testing, which is considered a statistically valid snapshot. Comparing the typing results from 2005 and today, there appear to be both regional variations and a shift in ribotypes over this three year period. Val explained that in 2005, from the midlands southwards, types 027 and 106 were predominant whereas type 001 was still the major type in Northern regions. Currently, type 027 predominates everywhere except the North East and type 001 has been almost eradicated in several regions. All strains tested were sensitive to metronidazole, vancomycin, amoxicillin-clavulanic acid and piperacillin-tazobactam. Most strains were resistant to imipenem and levofloxacin, as well as being intrinsically resistant to the cephalosporins. Ribotypes 001, 027 and 106 were also resistant to erythromycin and moxifloxacin. Val highlighted that type 027 appears to be responsible for more recurrent episodes in patients, and that it produces toxins for longer periods and its spores may have longer survival times, all of which add to its infectious ability, without specifically making it more virulent.

The third talk was given by Dr Angela Kearns (Head of the *Staphylococcus* Reference Laboratory in England and Wales) on the subject of PVL producing *Staphylococcus*

aureus. Angela explained how a toxin that had a destructive effect on leucocytes was first described in 1894 by Van de Velde, but it was Panton and Valentine who picked up on this several years later and hence the PVL toxin was named. The toxin comprises two exoproteins coded by two separate genes, *lukS-PV* and *lukF-PV*. It is phage encoded and therefore transfer is via horizontal transmission, but only a few strains are susceptible to the phage (2-10% of clinical isolates). Angela then went on to describe some basic differences between community and hospital acquired MRSA strains, with the former often containing the PVL genes. Further details about international outbreaks were described where community acquired pneumonia (CAP) with PVL-positive *S. aureus* was responsible for very high mortality rates (*ca.* 75%). Three indicators for severe staphylococcal CAP were proposed: haemoptysis, very high C-reactive protein (CRP) and leukopenia. These patients may also have pre-existing staphylococcal skin infection, often post-viral. Angela then described outbreaks with PVL-positive strains that have spread throughout the world, citing the Australian Phage type 80/81 methicillin sensitive *Staphylococcus aureus* (MSSA) of the 1950s and the current problem caused by the USA300 MRSA strain.

This community strain appears to be replacing the standard hospital acquired strain in US hospitals and now contains multiple resistance genes and appears to be spreading into Europe albeit in small numbers. Finally, Angela informed the audience that at present, in the UK the number of PVL-positive cases is modest (496 in 2006) and mainly due to MSSA strains. As far as MRSA strains are concerned, there are approximately 12 different types of PVL-positive strains and the main phenotypic marker is sensitivity to ciprofloxacin.

The final presentation was given by Dr Mark Fielder, Principle Lecturer at Kingston University. Mark's topic was *Mycoplasma pneumoniae* — the hidden cause of respiratory tract infections (RTI's). Mark went on to describe how *M. pneumoniae* is a pathogen of the lower respiratory tract, classically presenting as atypical pneumonia, with a dry productive cough but minimal tissue damage, although occasionally more severe symptoms may develop. Mark described how mycoplasmas are the smallest known self replicating organism and are pleomorphic in appearance due to their lack of cell wall. They are also very fastidious and require specific media, Eaton's media or a specific biphasic medium (SP4 + glucose), although small variations even in these media dramatically affect growth. There is usually a worldwide epidemic every 4-8 years, mainly in the young (5-15 year olds) and spread to close contacts via droplets. Although usually diagnosed clinically, Mark described the various detection methods available. The treatment of choice is usually a tetracycline or a macrolide, although erythromycin resistance has been recently reported. Mark finished off by describing some of the complicated clinical cases that have been reported, and warned that brain abscesses caused by *M. pneumoniae* have been described, but asked if the majority of laboratories would isolate them from brain abscess pus?

Finally, there was a brief question and answer session, after which the chairperson brought what had been a very successful meeting to a close, and wished the delegates a safe journey home. There were many new faces present at the meeting, which was probably due to the clinical focus of the day. It is hoped that the day was enjoyed by all and we look forward to welcoming both fresh and familiar faces to future events.

Reference

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Steve Davies

Summer conference 2008

Including the Lewis B Perry Memorial Lecture — ***Microbiology in the political arena*** given by Dr Bernard Dixon OBE

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Bernard Dixon

19.00-20.00 **Drinks Reception - Queen's University Belfast**

20.00 **Evening at leisure**

21.30 **Quiz Night - Wellington Park Hotel**

Tuesday 8 July

Recreational waters

09.00-09.35 **Recreational water - would you dare go for a dip? Overview of recreational water and disease**
Julie Kinzelman, Racine Health Department

09.35-10.00 **From bath toys to recreational and hydrotherapy pools**
Adam Fraise, Birmingham Hospital, UK

10.10-10.45 **Recreational exposure to *Leptospira***
Jarlath Nally, University College Dublin, UK

10.45-11.15 **Coffee/ posters**

11.15-11.50 ***Vibrio vulnificus*: a killer lurking on our beaches**
James Oliver, University of N. Carolina, USA

11.50-12.25 **Aquatic mycobacteria**
Joseph Falkinham, Virginia Tech, USA

Industrial/commercial water use

12.25-13.00 **Disease outbreaks associated with aquaculture using waste heat from industry**
Keith Way, CEFAS, Weymouth, UK

13.00-14.00 **Lunch**

14.00-14.35 **Antimicrobial usage in aquaculture: problems with microbial resistance, its determination and interpretation**
Peter Smith, NUI, Galway, UK

14.35-15.10 **Norovirus reduction in commercial depuration in Europe**
Rachel Rangdale, CEFAS, Weymouth, UK

15.10-15.45 **Sterile but unsafe: endotoxin testing in water in the pharmaceutical industry**
David Guy, Lonza, Wokingham, UK

15.45- 16.15 **Tea/posters**

16.15-16.50 **Biofilm problems in dental unit water systems and its practical control**
David Coleman, University of Dublin, Ireland

16.50-18.00 **Student Session**

17.30-19.30 **Trade Show**

Wednesday 9 July

Management of contaminated waters

09.00-09.35 **Private water supplies**
David Kay CREH, University of Wales, UK

09.35- 10.10 **Wastewater disinfection**
Nigel Horan, University of Leeds, UK

10.10-10.45 **Impact of sheep dip pesticides on biofilms involved in secondary sewage treatment**
Keith Jones, University of Lancaster, UK

10.45-11.15 **Coffee/ posters**

11.15-11.50 **Health risks associated with flooding**
Lorna Fewtrell, Centre for Research into Environment and Health, Crewe, UK

11.50-12.25 **Wastewater use in agriculture**
D. Mara, University of Leeds, UK

12.25- 13.25 **Lunch**

13.25 -14.00 **Soil aquifer treatment of drinking water to remove cyanobacterial toxins and microorganisms**
Howard Fallowfield, Flinders University, Australia

14.00-14.35 **Myth management and risk assessment for *Legionella***
John Lee, HPA, Colindale, UK

14.35 -15.00 **Tea/Posters**

15.00 -16.00 **Student presentations**

16.00 -16.30 **WH Pierce Prize**

16.30 -17.00 **AGM**

19.30-20.00 **Drinks reception followed by dinner - Stormont Parliament Building**

Thursday 10 July

Potable water

09.00-09.35 **Exposure & health risk of *Salmonella* and enteric viruses in recycled water used for crop irrigation**
Chuck Gerba, University of Arizona, USA

09.35-10.10 **Safe water in the developing world - on site testing and solar pasteurisation**
Jamie Bartram, WHO, Geneva, Switzerland

10.10-10.45 **Finding a needle in a haystack: detecting *Cryptosporidium* in drinking waters**
John Watkins, CREH Analytical Ltd, Leeds

10.45-11.15 **Coffee/ posters**

11.15-11.50 **Outbreaks of infectious disease associated with private drinking water supplies in England & Wales 1970-2005**
Gordon Nichols, HPA, Colindale

11.50-12.25 **Environmentally adapted strains? Multi locus sequence typing of *Campylobacter jejuni* and *C. coli* in surface waters and humans**
Will Sopwith, HPA, Colindale, UK

12.25-13.00 **The microbiology of bottled mineral waters**
Gilbert Lamothe. Nestlé Waters MT, Vittel, France

13.00-14.00 **Lunch & Close**

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LICHEN COMPETITION:
two-dimensional warfare in slow motion

This image and all figure images by kind courtesy of Dr K M Wade

Dr Richard Armstrong likens lichens to todays business world looking at competition between lichens and how this affects their communities

Lichens, a symbiotic association between a filamentous fungus and an alga, are often found in stressful environments such as the surfaces of rock and tree bark.

Under these conditions, lichens experience extremes of temperature, moisture supply, and low availability of nutrients (Grime, 1979). As a consequence, lichens sequester a large proportion of their carbon production for stress resistance rather than for growth (Farrer, 1973). This means that as a group, lichens are particularly slow growing organisms with many species growing at less than 2mm per year and some at less than 0.5mm per year. Whether or not competition occurs between lichen thalli (the undifferentiated structures of lichen) in these communities is controversial (Armstrong & Welch, 2007). Competition is defined as *"the negative effects that one organism has upon*

another by consuming or controlling access to a resource that is limited in availability" (Keddy, 2001). Hence, competition occurs when a resource is limited and results in detrimental effects on one or more species which in turn affects the overall composition of the community.

Grime (1979) divided plant communities into three groups according to whether a 'ruderal', 'competitive', or 'stress tolerant' strategy predominated amongst the species. In this scheme, lichens were considered to be stress tolerant organisms and therefore, to occur in communities in which competition was less likely to occur. By contrast, descriptive and experimental studies of lichen communities often provide compelling evidence that competition is important in determining the distribution of individual species and the composition of communities (Barkman, 1958; James *et al.*, 1977). This article discusses the evidence that competition occurs between lichens on rock and tree bark and assesses whether competitive effects are likely to be important in structuring these communities.

Does competition occur in lichen communities?

On rocks in New Zealand, crustose species in which the thallus comprises a thin crust more or less tightly pressed up against the solid rock surface (substratum), are the first colonisers of freshly deposited surfaces, usually within five years of exposure (Orwin, 1970). Foliose species, that is species with leaf-like marginal lobes which are more loosely attached to the substratum, appear only after the initial crustose phase. Once present, however, individual species tend to persist throughout the succession; their frequency often increasing with surface age rather than being removed by competition. By contrast, John (1989, 1990) concluded from studies of the Jonas Rockslide in the Canadian Rocky Mountains, that competition played a significant role in the patterning of the species. Reid (1960) and Yarranton and Green (1966) have both reported similar conclusions from studies of the zonation (spatial pattern) of lichen vegetation on rocks bordering streams and the pattern of vertical distribution on cliffs at Rattlesnake Point, Ontario respectively.

Competition has also been observed on rocks on the seashore (Wootton, 1991). In the presence of bird droppings, the vertical distribution of the orange lichen zone (dominated by *Xanthoria elegans* (Link) Th.Fr. and *Caloplaca marina* Wedd.) was elevated on the shore while that of the grey lichen zone (dominated by *Physcia* species) was eliminated. In addition, in the splash zone, *Verrucaria mucosa* Wahlenb. Ex Ach. declined as a result of enhanced competition with the green alga *Prasiola*.

Barkman (1958) was one of the first to systematically investigate lichen communities on tree bark and concluded that epiphytic lichens exhibited a number of different competitive interactions including competition for light and chemical interference (allelopathy). Degelius (1964) found on ash trees that an early phase dominated by crustose species endured for several years until overgrown by foliose species. There was also evidence that the 'stronger' foliose competitors such as *Parmelia acetabulum* (Neck.) Duby and *Anaptychia ciliaris* (L.) Korb could overgrow 'weaker' competitors such as *Xanthoria parietina* (L.) Th. Fr. and *Parmelia sulcata* T.Tayl. Furthermore, some crustose species, e.g., members of the genus *Pertusaria*, were able to outcompete *X. parietina*. By contrast, Welch (2002), found that crustose species never outcompeted foliose species. In fact, some foliose species preferred to occupy sites where crustose species were predominant, presumably because the crustose species were less effective than other foliose species as competitors of foliose lichens (Welch, 2002).

Hence, many lichenologists who have observed and studied lichen communities have come to the conclusion that competition does occur between lichen thalli and that these interactions may be important in determining the distribution of individual species and the structure of communities.

How can lichen competition be studied experimentally?

Lichen communities on rock and tree bark do offer a simple model system in which competition for space and light on a substratum can be studied experimentally — essentially in two dimensions (Armstrong & Welch, 2007). An 'additive' experimental design has been used to study lichen competition (Armstrong, 1982). In an additive design, each species is grown in monoculture and paired in 1:1 mixtures with each of the other species. This design was used to study competition between three species of foliose lichens in north Wales (Armstrong, 1982). The lichens were glued as fragments in an alternating pattern in experimental plots marked out on pieces of slate that were then placed on horizontal boards in the field (Figure 1). Figure 2 shows the results of one of the species combinations, *viz.*, competition between fragments of *Parmelia conspersa* (Ehrh. ex Ach.) Ach. and *Parmelia glabratula ssp. fuliginosa* (Fr. Ex Duby) Laund. There was an increase in the area of *P. conspersa* over 30 months, with the exception of the period 18 - 24 months when thallus area declined. There was a small increase in area of *P. glabratula ssp. fuliginosa* during the first six months but thallus areas then declined until the end of the experiment, clearly indicating that *P. conspersa* was the 'winner'. The results for all three species tested in this experiment suggested that the lichens competed in the following order of competitive ability: *P. conspersa* > *P. saxatilis* > *P. glabratula ssp. fuliginosa* (Armstrong,

Figure 1. *Studying lichen competition experimentally: lichens are glued as fragments in an alternating pattern in experimental plots marked out on pieces of slate which are then placed on horizontal boards in the field. Light coloured fragments are Parmelia conspersa and dark fragments Parmelia glabratula ssp. fuliginosa.*

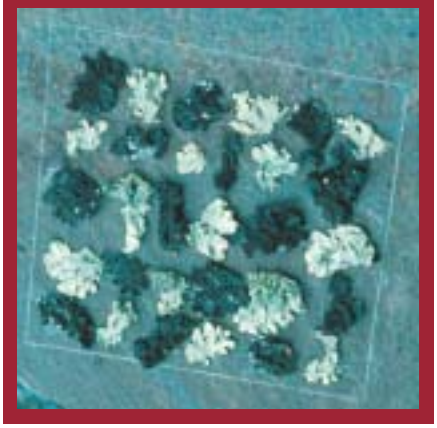


Figure 2. *Results of a competition experiment involving Parmelia conspersa (PC) and Parmelia glabratula ssp. fuliginosa (PG). There is an increase in the area of P. conspersa over 30 months, with the exception of the period 18 - 24 months when thallus area declines. There is a small increase in area of P. glabratula ssp. fuliginosa during the first six months but thallus areas then decline until the end of the experiment.*

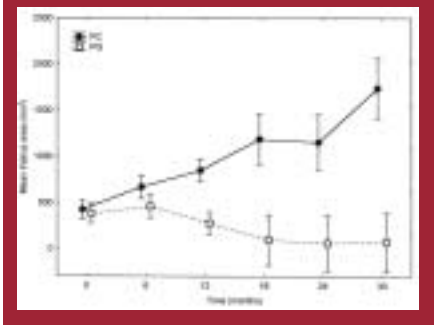
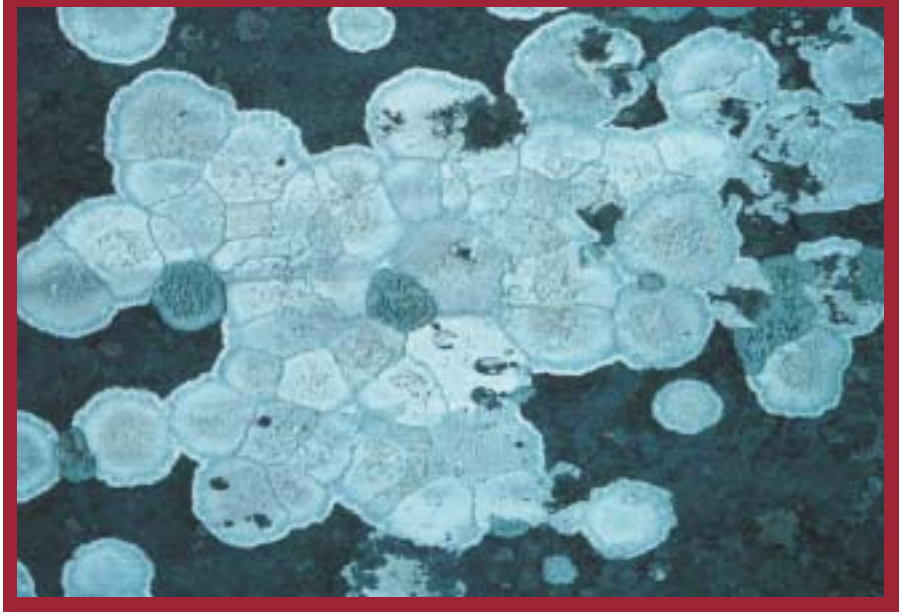


Figure 3. *A lichen 'mosaic' of crustose species growing on a slate gravestone in north Wales.*



1982). By employing a factorial experimental design and using analysis of variance (ANOVA) to estimate competitive effects, the method can be used to study competition in several species at the same time (Armstrong, 1986).

What happens when two lichens meet?

When lichens grow on a substratum they grow radially and eventually the margins of thalli come into contact with each other. The processes that occur when two thalli meet are crucial in understanding the outcome of lichen competition. In his study on rocks in Wales, Pentecost (1980) listed several possible outcomes of lichen competition: 1) one species overgrows another, 2) neither species grows at the point of contact ('truce' condition), and 3) one species may grow epiphytically on the other. The actual outcome of contact may depend on the growth form of the lichen, marginal contacts between crustose species being more likely to result in 'truce' conditions than between foliose species (Pentecost, 1980). Some of these phenomena can be seen in the lichen community photographed on a slate gravestone in Wales (Figure 3).

Published studies provide considerable evidence for a species overgrowing another especially in relatively undisturbed communities. In a photographic study of a saxicolous lichen community, Hawksworth and Chater (1979) found that *Ochrolechia parella* (L.) Massal. overgrew thalli of *Rhizocarpon obscuratum* (Ach.) Massal. but reached equilibrium with *Lecanora gangaleoides* Nyl. Similarly, Pentecost (1980) found that in a community dominated by *Caloplaca heppiana* (Mull. Arg.) Zahlbr. and *Caloplaca aurantia*, (Pers.)Hellb. the 'truce' condition was the commonest outcome; whereas in communities of foliose species and foliose/crustose species, overgrowth was more likely. Also, species such as *Lasallia pustulata* (L) Merat. are frequently successful because the thallus is attached at a single point and the margins are raised above the surface of the substratum (Harris, 1996). Species such as *L. pustulata* can also attach themselves to the surface of other thalli essentially growing as an epiphyte and shading portions of the host thallus (Figure 4).

Figure 4. *A species of the lichen genus Lasallia (Umbilicaria) growing epiphytically on the surface of a foliose lichen on rocks in north Wales.*

What determines competitive success?

Various aspects of lichen biology may determine the success or failure of a species during a competitive interaction. Four factors were listed by Pentecost (1980) as important in saxicolous communities, *viz.*, colonisation rate and density, radial growth rate (RGR), type of contact between species, and rate of thallus senescence.

In experiments in which fragments of foliose lichens are grown in binary mixtures (Figure 1), the species with the faster RGR is usually the most successful (Armstrong, 1982). A species with a fast RGR is able to colonise the available space on a substratum more efficiently than its competitors and may be able to overgrow neighbouring thalli more effectively if thallus morphology permits. In complex mixtures, however, it is more difficult to predict the competitive outcome of a mixture from the RGR of the constituent species. Armstrong (1986) found that P. *glabratula ssp. fuliginosa* and *P.*

Figure 5. *Lichens of the genus Caloplaca growing on a gravestone in north Wales. Many thalli show the results of the degeneration of the thallus centre, the formation of 'windows' and growth of new thalli within the 'windows'; in this case of the original species.*

saxatilis grew better in a three-species mixture with the faster growing *P. conspersa* than either did in two-species mixtures with this species. It is possible that *P. conspersa* competes less efficiently when two competitors are present, a process that may allow the three species to coexist. Hence, although RGR may be an important competitive attribute, it becomes less useful as a predictor of the outcome of competition in more diverse communities.

As many lichen thalli age, the central portions grow older creating a space or 'window' (Pentecost, 1980; Armstrong & Smith, 1997). This space can be exploited by lichen thalli of the same or a different species (Figure 5) and this could be an important factor determining the outcome of competition on a substratum. Hence, complete exclusion of a weak competitor may be delayed or prevented if the thalli are able to colonise the windows formed in the centres of a more successful competitor (Pentecost, 1980; Armstrong, 1982).

The morphology of a lichen could be an important competitive attribute. In various experiments (Armstrong, 1982; 1986), the faster growing *P. conspersa* was often the most successful competitor especially in two-species mixtures (Figure 2). This species, however, also possesses lobes which are wider and thicker than most of its competitors enabling it to overgrow its neighbours more effectively. The importance of growth form has also been demonstrated in umbilicate species, where their competitive success is partly due to the morphological characteristics of the species and especially margin height (Harris, 1996). Hence, in foliose-foliose interactions, the mass and relative heights of the opposing lobes may be an important predictor of competitive success.

The importance of lichen chemistry in lichen competition is controversial. Over 500 secondary metabolites have been reported in lichens of which 350 are unique to the symbiosis (Lawrey, 1995). Most of these metabolites are weak phenolic compounds produced by the fungal partner and which accumulate in the outer walls of the hyphae. For many years there have been claims that such compounds, when leached from the thallus, may suppress neighbouring lichens and therefore, be important in competition (Lawrey, 1995). For example, Beschel (1965) studied various slow growing crustose species and found that bare areas a few centimetres wide surrounded thalli of *R. geographicum*. Faster growing species that invaded this space disintegrated on the outer rim of the bare area and it was concluded that a 'diffusing antibiotic' may have been responsible.

Is competition important in lichen communities?

It has been argued that two or more species cannot coexist on a single resource without the species forming a 'competitive hierarchy' which results in poor competitors being replaced by superior ones (Tilman, 1982). In the study of Armstrong (1982), however, no species was excluded from a binary mixture in all three replicate plots after a three-year study period, even though significant overgrowth had clearly taken place. The survival of 'poorer' competitors was enhanced in some plots by small variations in the aspect, slope, and microtopography of the substratum as well as by the formation of 'windows' due to thallus senescence. Hence, stability and coexistence may be more likely outcomes when the constituent species have similar competitive attributes.

Coexistence is also more likely to occur in complex communities (Armstrong, 1986). Tilman and Kareiva (1997) demonstrated that multispecies coexistence occurs because species at the top of the hierarchy cannot occupy all sites simultaneously. Local displacement is never permanent so that when the better competitors die, sites become available for colonisation by less efficient competitors (Armstrong, 1982). In addition, competitive interactions in three-species mixtures cannot always be predicted from two-species mixtures (Armstrong, 1986; Welch, 2002). Hence, *P. glabratula ssp. fuliginosa* and *P. orbicularis* actually grew better in three than in two-species mixtures with *P. conspersa* suggesting that the three foliose species are able to coexist on well-lit rock surfaces. These results suggest that although competition between neighbouring lichen thalli may be intense, the process may not necessarily lead to competitive exclusion in more complex communities. Another effect that can be observed in lichen communities is that of 'competitive release'. This is an advantage to a poorer competitor due to a reduction in the intensity of competition (Lawrey, 1981). On two islands in the Potomac river, P. conspersa and *Pseudoparmelia baltimorensis* (Gyel. & For.)Hale dominated communities on both islands with *P. conspersa* being more frequent at high light environments and *P. baltimorensis* at low light environments. However, *P. conspersa* was able to occupy intermediate light intensity habitats in species poor environments where presumably, the intensity of competition was substantially reduced.

Does competition occur between symbiotic organisms generally?

The fact that lichen competition is commonly observed raises the question of whether it occurs in symbiotic communities in general. In managed agricultural systems in South Australia, if the soil environment is not stressful to root nodule bacteria, it becomes a competitive environment for nodulation soon after introduction of the inoculated legume (Howieson & Ballard, 2004). These results support the view that there may be little competition under conditions of stress (Grime, 1979).

There may be parallels between lichen dominated systems and other ecosystems in which fungal symbioses are present. Many trees and shrubs, for example, develop a thick layer of fungal hyphae (ectotrophic mycorrhiza) which connect root cells with the external soil environment. These types of interaction are abundant near the soil surface and enable nutrient elements formed during the decomposition of litter to be effectively reabsorbed. This type of symbiotic community is strongly associated with mineral nutrient stress, e.g., on heathlands and certain scrub communities (Grime, 1979). As in lichen dominated systems, the symbiotic communities appear to be long-lived and this may enable the plants to exploit the limited number of periods when nutrients become available.

It would appear quite plausible that competition between symbiotic fungi is present in these communities. Moreover, there is direct evidence for competition among arbuscular mycorrhizal fungi (Cano & Bago, 2005). Studies of three fungal isolates indicated a lack of antagonism when hyphae were exploring beyond the root tip but growth limitations were observed due to competition closer to the growth tip.

From this, we can conclude that, competition may be more important than previously thought in stressful environments involving symbiotic organisms.

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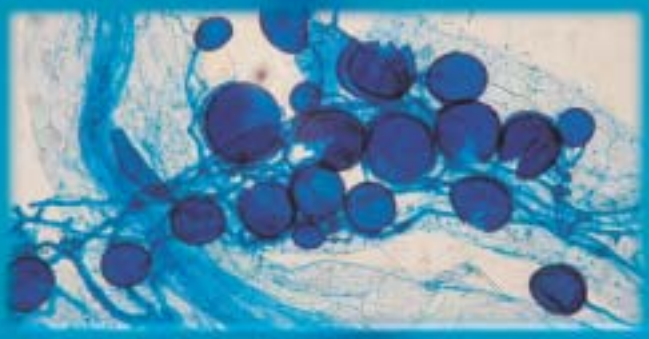

▲ *Mycorrhizal fungus spores in roots*

▲ *Pithomyces chartarum spores*

▲ *Trichocladium asperum*

▲ *Trichoderma viride development*

James Wearn explores the nature of plant-associated microfungi

Mycological-botanical contracts: species around the discussion table?

Plant-associated microfungi have received attention for many years but little research had been directed towards the biology of the fungi. Only in recent years have attempts been made in earnest to understand the nature of interactions further than the effect upon the plant concerned. It is well known that plants have a surface mycobiota on their flowers, stems and leaves (known as phylloplane or epifoliar fungi) and that pathogenic fungi (with obvious outward indicators of their presence) can have a profound effect upon crop plants. However, it is only now that we are discovering the diversity and identity of endophytic microfungi supported inside plant tissues (Wearn 2008). Endophytes are fungi that live within plant organs asymptomatically. They are often quite different from those on the surface of a plant and interact directly with the host plant's physiology. Thus, plant communities must be considered not only for their botanical properties but for the wealth of mycobiota within them. This unseen diversity is opening up new avenues for research.

Microbiologists and ecologists alike (albeit often with different goals) have within the last decade begun to carry out meaningful projects to catalogue fungal species in various grasses, trees, and herbaceous plants. The intention is that these species can then be isolated, cultured, and either analysed for potential pharmaceuticals, or for field trials as bio-control agents or plant growth promoters. Nevertheless, there is still a long way to go, with many fungal species still being recorded from places they were not known to occur. In the last year alone, I have isolated several particularly interesting fungal species from plants where they had never before been found and a couple of others that have never even been recorded in the UK. The fungus *Pithomyces chartarum*, a mycotoxin-producing species that can cause facial eczema in grazers, was also isolated as a foliar endophyte from *Cirsium arvense* (creeping thistle) and two possibly undescribed species of Coelomycete fungi (from *Plantago lanceolata*) are the subjects of further investigation. This phenomenon was produced from only three different herbaceous plant species from two field sites in southern England so it is obvious that records are nowhere near complete. The book *Microfungi on land plants* (Ellis & Ellis 1997), forms a good list of microfungi found on terrestrial plant material but as yet there is no comprehensive work on endophytic fungi. It could be that climate change has allowed fungal species previously absent from the UK to colonize and it is clear that fungal fruiting patterns have been affected (Gange *et al.* 2007). However, it is more likely that insufficient sampling of natural communities has been carried out and that as we endeavour to explore plant communities more extensively, a greater diversity will be discovered (Arnold & Lutzoni 2007).

The lifestyle of each fungus in a plant varies along a continuum from mutualistic to pathogenic. Some live in apparent social harmony while others live in constant combat with their hosts. It seems fungi are a lot like people really. The metaphorical "discussion table" in the title simply illustrates that just as deals between tenants and landlords in our world can be made or broken, so in the micro-world "deals" can exist between fungi and plants. Where mutualistic relationships exist between plants and fungi, they have been formed through co-evolution. This is simply a long history of deals and trade-offs. Fungi also compete with each other and other micro-organisms for resources within a plant; just as rival companies compete for customers, office space and business contracts. Endophytes appear to interact in balanced antagonism with their hosts, each producing metabolites to defend themselves against the other (Schulz & Boyle 2005). Where they are equally matched the fungus remains in the plant and where the plant defences out-compete the fungus it is removed. Thus, the mycobiota within an individual plant at any interval in time is largely owed to the outcome of this interaction and the fungal community within the plant changes throughout the year.

Mycorrhizal fungi are the most well-known group of endophytes. These root-associating fungi are obligately biotrophic, relying on plant photosynthates to survive and in return supplying nutrients to the host. They are currently regarded as the most important subterranean symbiosis between plant and fungus for over 80% of the plant species on earth as they have the ability to enhance growth and promote resistance to pathogens (Jeffries *et al.*, 2003). Efforts have therefore been made to produce inocula, usually in the form of dried spores and root fragments, for use in agriculture and horticulture. Fungal species identity appears to be as important as presence at all in a growth system because not all mycorrhizal species will act beneficially towards each plant targeted. Thus, it is essential to tailor inocula to each application for any benefit or cost-effectiveness to be derived. In addition, land use and management strategies can have differing top-down effects upon the mycorrhizal community and through connectivity have an indirect influence upon bottom-up effects on the plants themselves, depending on the ecosystem (Wearn & Gange 2007).

While the interactions of mycorrhizal fungi have been relatively well explored, those of other microfungi in both aerial and subterranean plant organs are less well understood. In fact fungi previously regarded as general saprophytes may well have been wrongly functionally classified (Parberry 1996). Some known pathogens have also been isolated from asymptomatic tissue, posing questions about the functionality of these organisms under different environmental conditions, including being present inside hosts with which they are not normally associated. Can plants that do not show necrosis or other detrimental effects of the fungi be reservoirs? This is a worrying prospect if these plants are present alongside crops that the fungus can ruthlessly invade and destroy. On the other hand, certain isolates of pathogens which vary enormously in virulence (such as *Alternaria alternata*) may be used as mycoherbicides against pernicious weeds. They may also be used to reduce the destructive ability of other pathogens. For example, isolates of *Alternaria* and *Cladosporium* have been used to reduce damage caused by *Botrytis cinerea*. Evidence is also emerging that demonstrates the abilities of several microfungi commonly isolated as endophytes (including species of *Trichoderma* and *Aspergillus*) to act in a similar way to mycorrhizas (Barrow & Osuna 2002). Further, the anticancer drug taxol, previously known only from *Taxus* (yew) has now been discovered from several genera of endophytic fungi. In fact the prospects for identification of new pharmaceutical, bio-protective and bio-control agents among endophytic fungi are likely to be very good.

A key factor governing the ability of certain microfungi to reduce damage to plants by other pathogenic fungi seems to

Acremonium bacillisporum

be timing of infection or inoculation. Studies on mycorrhizal fungi and other endophytes have shown that the first fungus into a plant organ acquires the resources it needs. It is often then able to prevent subsequent colonization by other species (or even genetically different isolates of the same fungal species), provided that it is a strong competitor. Simple competition assays on agar plates demonstrate a hierarchy of fungal success when confronted with competitors. Whether fungi competing within a plant directly battle with each other via toxin production or if they enlist the aid of the host is unclear. It is probable that certain fungi can induce production of specific defence compounds by the host to which only the inducer is tolerant. In this way they may be able to exploit their relationship with the plant. Nevertheless, when sampling natural plant populations, numbers of fungal species within the above-ground and below-ground organs of a single plant often reach double figures (even in temperate regions). As such no single fungus is obviously able to eliminate the presence of all others, though this may not be necessary with the large amount of niche space available in a host.

Foliar endophytes exist in a quite different colonization system than root endophytes and rarely seem to be systemic between the two systems. While a fungal species may occur both in shoots and roots of the same plant it is not usual that this is the same isolate spreading extensively through the host. One must at the same time bear in mind that the above-ground and below-ground organs of a plant are interconnected and should not be separated in terms of physiological interactions since top-down and bottom-up effects of one upon the other are frequently observed. Generally, foliar endophytes are more localized in colonization, colonizing intracellularly whereas root endophytes are usually much more extensive, colonizing intra- and intercellularly (Schulz & Boyle 2005), yet despite this there does not appear to be a lower diversity of endophytes in roots as niche hypotheses would predict.

The critical issue is that there is a deficiency of morphological taxonomic skills amongst younger members of the mycological community. I am also aware that this paucity is not only restricted to the microbiological division of scientific research. While molecular research has provided essential tools for characterizing and classifying species, there is still a strong requirement for traditional morphological techniques to be integrated with DNA-based research. The lack of positively confirmed sequences in databases (such as Genbank) used for comparison of study results brings forth the dilemma of experimental conclusion. Two problems currently exist. Either the existing sequences are erroneous, so any comparisons lead to unfounded conclusions, or there is no existing sequence with which to compare one's experimental data. In the second instance, one requires morphological skills to identify the species/isolate. Unfortunately this raises further questions as to the comprehensiveness of existing taxonomic keys. Even keys for relatively common genera require some revision.

It is essential to be mindful of the history of scientific study of fungal systems alongside the ecology of the interactions themselves. Both are important considerations for the furtherance of our understanding and the subsequent derivation of viable applications. However, while it is clear that there is much work to be done, collaboration of scientific disciplines with backing from relevant organisations will allow such goals to be achieved; the product of which will have the potential to benefit humanity and the natural world alike.

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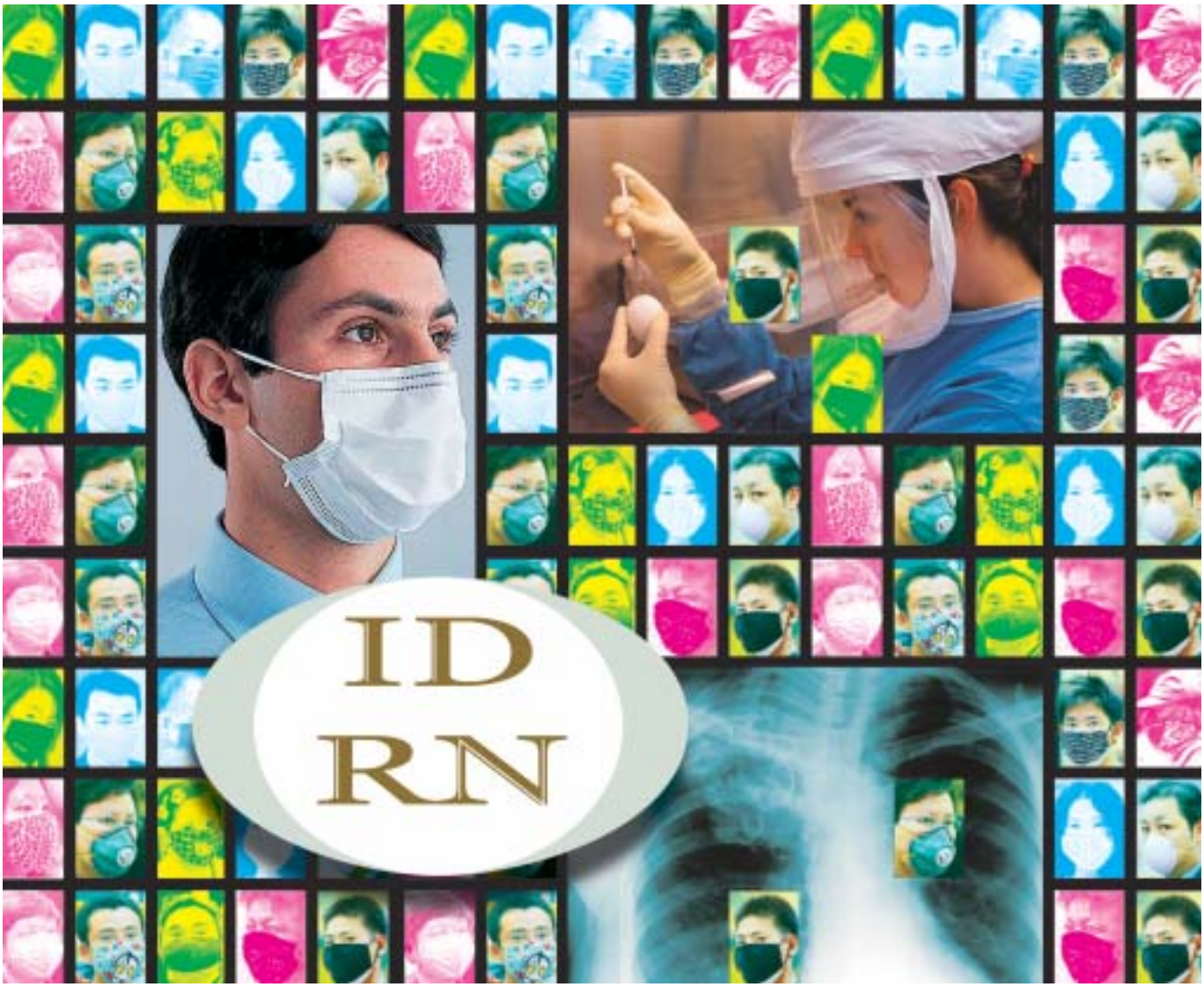

Come and collaborate

Michael Head introduces the work of the Infectious Disease Research Network (IDRN)

The Infectious Disease Research Network (IDRN): it is possible you have heard of it. In fact, you may already be a member — amongst our 1200-strong membership, microbiology is well represented. But for those of you who have never heard of us, or indeed, those who are only vaguely aware of how the Network operates, then read on. You might just learn about a very useful resource awaiting your attention…

Following an initial approach from the Department of Health, the network was set-up in late 2001, and became fully operational in the spring of 2002. Supported with funding from the National Co-ordinating Centre for Research Capacity Development (NCCRCD), the IDRN began life operating as a London network, before being re-funded in 2006 with a broader remit that included coverage throughout the UK.

The basis of our remit is to provide an infrastructure that can increase the capacity of translational infectious disease research across the country. The quality of research can typically be strengthened when the project involves collaborations across disciplines, with an amalgamation of different expertise, types of workplace and knowledge (and sometimes geographical representation). It is these kinds of collaborations that the IDRN actively promotes, and we have a variety of methods to achieve this.

The IDRN carried out a consultation exercise (2005) that received over 200 responses. The exercise demonstrated a strong demand for infrastructure that can provide advice on governance, and access to support on the epidemiological, clinical and statistical aspects of study design. What was also evident from the analysis of our consultation was a need to support academic microbiology, an opinion that has variously been demonstrated by other professional bodies. In 2001, The Royal College of Pathologists (2001) commented on 'the erosion of microbiology', whilst the Academy of Medical Sciences (2001) concluded in the same year that the majority of medical microbiology departments in the UK are 'in a state

of torpor'. Fighting Infection (2003), the House of Lords report, recommended closer engagement between basic scientists, clinicians, epidemiologists and health protection specialists.

It is from this background that we took forward the work of the IDRN. Perhaps key to our success has been the organisation of various multi-disciplinary research strategy workshops, that help to identify what the research priorities on designated topics might be, and to initiate networking amongst the participants – many an informal or formal collaboration has begun when chatting over coffee, and these can be very fruitful. The workshops themselves are usually structured with presentations from keynote speakers who can spark some discussion in a specified area of research, followed by break-out groups that allow the exchange of views on priority questions. With a multi-disciplinary audience, many of the skills required to answer these questions may already be in the room. We have organised over a dozen workshops across many topics, ranging from antimicrobial resistance to zoonoses, bioterrorism to prison health, behavioural sciences to sexual health.

During the workshops the groups come up with various ideas and research questions, but then what? In terms of workshop follow-up, the IDRN can organise smaller, more focused protocol development groups, that retain the enthusiasm generated at the larger workshops, and provide a forum to put together the basis of a grant application. The IDRN may support these groups by various means, such as co-ordinating diaries, booking and paying for meeting rooms, taking minutes, performing literature searches, and generally alleviating the workload of the principal investigator and co-applicants. Where necessary, the IDRN can also contact potential collaborators and identify those with appropriate expertise that is not already within the groups.

Our multi-disciplinary multi-organisation steering group, IDRN co-ordinating centre and also our researchers database allow us to identify relevant expertise for our events and projects. The researcher's database is an online searchable tool that provides a list of IDRN members with an understanding of certain disease areas or specific microorganisms, or simply people who are experienced in various specialised subjects, such as statistics, modelling or ethics. The database can also be searched by geographic location. If per chance you need a health economist who has experience in infectious disease, then come to us. We can help you. Look at it as online dating, but with a useful twist (and less time spent wondering if that photograph they've emailed you is genuine or not).

The IDRN has been involved in the development of a wide range of research projects, a few examples being: the Food Standards Agency National Intestinal Infectious Disease Study, the Medical Research Council (MRC) Flu-Watch cohort, the MRC I-STRAT trial (looking at the impact of isolation strategies on rates of *C. difficile* and MRSA infection), the National Observation Study on the Effectiveness of the Clean Your Hands Campaign and Feedback Intervention Trial (NOSEC and FIT, both funded by the National Patients Safety Agency), the Department of Health funded Evaluation of mobile x-ray unit for tuberculosis screening, and a study on chronic hepatitis B in the UK, funded jointly by industry and the Nuffield Foundation. A detailed list of research outcomes and publications is available at www.idrn.org/research.php.

Aside from workshops designed specifically to stimulate pieces of research, the IDRN also runs training events and these have included meetings on the Human Tissue Act, the EU Clinical Trials Directive, an MRC grantsmanship workshop, and medical molecular microbiology. Much of our work has been carried out with research funders — for instance, the grant-writing workshop was held jointly with the MRC, and we also organised a 'Challenge' workshop with the UK Clinical Research Collaboration on research priorities in the area of healthcare-associated infections and antimicrobial resistance. We also helped to launch the UK CRC Partners Translational Infection Research Initiative.

The IDRN website contains a wealth of information that is of use to all corners of the infectious disease community. We have online funding and training bulletins, that are updated monthly and provide details on current and future sources of grant-funding, conferences, short courses and postgraduate study. A mailing list provides more information on selected events and funding sources, with a monthly newsletter and weekly mailshot. The mailing list can also be used to gauge enthusiasm for your ideas from individuals or units — for example, the I-STRAT trial used the IDRN very successfully to recruit interested NHS Trusts, as did the NOSEC and FIT studies. There is the researchers database, and also our research mapping exercise that allows colleagues to link up with other research-active individuals. Plus let us not forget the most used section of the IDRN website — a jobs page, listing current infection research-related job vacancies around the UK! We also have the facility and expertise to design and host webpages, such as the survey set up for the HPA R&D department on behavioural sciences, the registration pages set up for the Association of Clinical Microbiologists meetings, and the study pages for the ORION statement and NOSEC studies (see our 'research' page for more information on these). If that service sounds of interest to you, please do get in touch.

That is how a relatively small administrative infrastructure can deliver a productive range of services and resources to the infectious disease research community. See our website if you wish to know more, and contact us if you would like to become a member. If you need any further encouragement, then we'd like to announce that IDRN membership is completely free. www.idrn.org will tell you all you need to know.

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In the thirteenth of a series of articles about statistics for biologists, **Anthony Hilton** & **Richard Armstrong** discuss:

A more complex analysis of variance incorporating a 'repeated measures' factor

Stat Note 13

In Statnote 12 (Hilton & Armstrong, 2008), we introduced the concept of the 'split-plot' experimental design as a variation of the fully randomized, factorial analysis of variance (ANOVA). An important feature of a fully randomized design is that the experimental subjects or 'replicates' are assigned at random to all possible combinations of the factors. With two factors arranged in a split-plot design, however, the two factors are not equivalent to each other and replicates cannot be assigned at random to all possible treatment combinations. Commonly in a split-plot design, one factor is the 'major' factor and the other the 'minor' factor. Replicates are often assigned at random to different levels of the major factor and then the different levels of the subplot factor may be assigned at random within each of the main

plots. In many circumstances, the minor factor is a 'subdivision' of the major factor; e.g., in the example described in Statnote 12 the 'chambers' (minor factor) can be regarded as subdivisions of a 'channel' (major factor) (Hilton & Armstrong, 2008). The ANOVA of a split-plot design is distinctly different from that of a normal factorial ANOVA in that it incorporates two error terms. One error (the main-plot error) is used to test the significance of the main effect of the major factor and the second (the sub-plot error) tests the main effect of the minor factor and its interaction with the major factor. A further variation of the split-plot design arises when the sub-plot factor represents measurements taken at different times on the same replicate or subject, often called a *'repeated measure.'* This Statnote discusses a more complex factorial experiment incorporating three different factors, one of which is a repeated measure.

Scenario

An investigator wished to examine the pattern of survival over a period of time of bacteria living on the surface of £5 notes. Two species, *viz.*, *Escherichia coli* and *Staphylococcus epidermidis* were inoculated onto the surface of a sample of £5 notes and the numbers of bacteria surviving subsequently estimated at 10 time intervals over a 55 hour period (Table 1). The experiment was replicated twice. Survival of the two bacteria on glass cover-slips over the same period of time was examined as a control. The objectives of the experiment were first, to determine whether there was a difference in the pattern of survival of bacteria on control surfaces as against £5 notes and second, to determine whether the two bacterial strains exhibited different patterns of survival over time. Hence, the interactions of the type of surface and bacterial strain with time are the 'effects' of particular interest in this experiment.

Experimental design

This experiment is more complex than described in previous Statnotes (Hilton & Armstrong, 2007, 2008). First, three factors are involved, *viz.*, bacterial species (2 levels, *E. coli* and *S. epidermidis*), surfaces (2 levels, glass cover-slips and £5 notes), and time of sampling (10 levels or times) and this results in a 'three-factor' (2 x 2 x 10) factorial. Second,

Table 1. The survival of *Escherichia coli* (EC), and *Staphylococcus epidermidis* (SE) on £5 notes and glass cover-slips (control) with two replications (all data are cfu cm^{-2} surface sampled)

Time (hours)	Notes		Control		Notes		Control	
	EC	EC	EC	EC	SE	SE	SE	SE
0	3800	3800	3800	3800	5400	5400	5400	5400
1	800	430	0	0	600	800	7	22
3	500	351	6	0	560	560	6	10
5.5	446	249	446	0	700	764	0	2
24	0	1	1	0	272	171	0	0
27	0	0	0	0	54	2	0	0
30	0	0	0	0	79	42	0	0
48	0	0	0	0	124	105	0	0
51	0	0	0	0	7	14	0	0
54.5	0	0	0	0	2	10	0	0

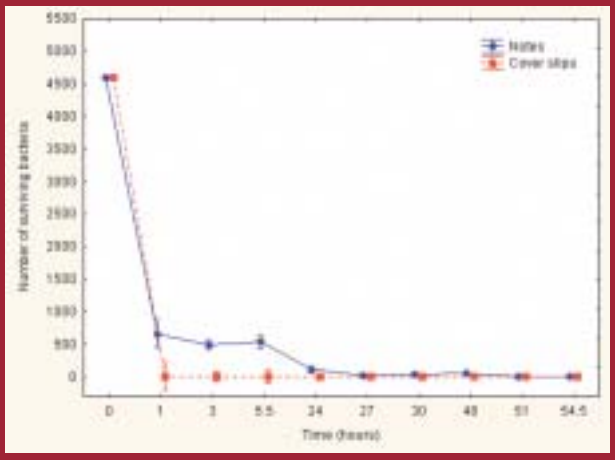
Table 2. Analysis of variance of the data illustrated in Table 1.

Source	*DF*	*SS*	*MS*	*F*	*P*
Bacterial Strain	1	909298	909298	140.81	<0.001
Type of Surface	1	719911	719911	111.48	<0.001
Bacteria x Surface	1	52480	52480	8.13	<0.05
Main-plot error	4	25480	6457.6	-	-
Time	9	146528276	16280919	5707.7	<0.001
Time x Bacteria	9	4332765	481418	168.7	<0.001
Time x Surface	9	1215098	135011	47.33	<0.001
3-factor interaction	9	65389	7265	2.54	<0.05
Sub-plot error	36	102687	2852	-	-

Abbreviations: *DF* = degrees of freedom, *F* = variance ratio, *P* = probability

the fact that repeated measurements of bacterial numbers are made on each surface leads to a 'repeated measures' design (Armstrong *et al.*, 2002), i.e., the same measurement (bacterial number) is made sequentially at specific time intervals on each replicate. In the ANOVA, there are two major factors (bacteria and type of surface) while time constitutes the repeated measures factor. As in the split-plot design (Hilton & Armstrong, 2008), there are two errors; the main-plot error tests the main effects of bacterial strain and type of surface and their interaction, while the sub-plot error

Figure 1. *Graph illustrating the two factor interaction between type of surface (cover-slips, £5 notes) and sampling time (F = 47.33, P < 0.001) averaged over bacterial strains. Error bars are 95% Confidence intervals.*



tests the main effect of time and its interactions with the other two variables.

Analysis of variance

The ANOVA of these data combine features of the previous two Statnotes (Hilton & Armstrong, 2007; 2008) and is shown in Table 2. Hence, there is a significant main effect of bacterial strain ($F = 140.81$, $P < 0.001$); a not surprising finding as there were considerably more *S. epidermidis* overall than *E. coli* on the notes and cover-slips. In addition, there is a significant main effect of type of surface ($F = 111.48$, $P < 0.001$) which suggests greater numbers of surviving bacteria, regardless of species, on the £5 notes compared with glass cover-slips. More interesting, however, is the interaction between type of surface and bacterial species ($F = 8.13$, $P < 0.05$) indicating that differences between surfaces varied with species; there being a slightly greater difference in numbers surviving between control and £5 notes in *S. epidermidis*. The main effect of time ($F = 5707.7$, $P < 0.001$) reflects the rapid decline in numbers over the period of the experiment in the experimental treatments as a whole regardless of species and surface. This decline, however, varies with type of surface ($F = 47.33$, $P < 0.001$) and with bacterial strain ($F = 168.7$, $P < 0.001$); a much more marked decline being observed on glass cover slips compared with £5 notes and in *E. coli* compared with *S. epidermidis*. There is also a significant three-factor interaction, which suggests a more complex relationship between all three variables. In more complex factorial experiments, interactions involving three or more factors are not easily interpretable and are often ignored.

Repeated measurements made on a single £5 note or cover slip will be highly correlated and therefore the usual *'post-hoc'* tests cannot be used (Snedecor & Cochran, 1980). Nevertheless, a significant interaction between the main-plot factor and time indicates that the *response curve* varies at different levels of the main-plot factor. A useful first step, therefore, is to examine the graphs of the different effects; an option usually provided by the statistical software. Figure 1 illustrates the graph of the surface x time interaction effect ($F = 47.33$; $P < 0.001$) and shows a more rapid and pronounced decline in bacterial numbers on cover-slips compared with £5 notes. In addition, it may also be possible to partition the main effects and interaction sums of squares into contrasts associated with particular types of response curve and test each against the appropriate error (Snedecor & Cochran, 1980).

Conclusion

Experiments combining different groups or factors and which use ANOVA are a powerful method of investigation in applied microbiology. ANOVA enables not only the effect of individual factors to be estimated but also their interactions; information which cannot be obtained readily when factors are investigated separately. In addition, combining different treatments or factors in a single experiment is more efficient and often reduces the sample size required to estimate treatment effects adequately. Because of the treatment combinations used in a factorial experiment, the degrees of freedom (DF) of the error term in the ANOVA is a more important indicator of the 'power' of the experiment than the number of replicates. A good method is to ensure, where possible, that sufficient replication is present to achieve 15 DF for the error term of the ANOVA used to test effects of particular interest (Ridgman, 1975). Finally, it is important to consider the design of each experiment because this determines the appropriate ANOVA to use. Hence, it is necessary to be able to identify the different forms of ANOVA appropriate to different experimental designs and to recognise when a design is fully randomized, in randomized blocks, a split-plot, or incorporates a repeated measure. If there is any doubt about which ANOVA to use in a specific circumstance, the researcher should seek advice from a statistician with experience of research in applied microbiology.

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careers

Alexandra Perry

Deneen Holohan

There are many different opportunities for scientists to work in the medical diagnostics industry. This month **Alexandra Perry** and **Deneen Holohan** talk about their roles in an immunodiagnostic company: The Binding Site Ltd. This company specialises in research, development and manufacture of innovative, high quality immunodiagnostic assays in the field of autoimmune disease, multiple myeloma and investigation of the immune response.

Medical diagnostics

Alexandra Perry

I am currently working as Raw Materials Manager. Before I explain what this role involves and my day-to-day activities, I will give a short overview of my career so far.

My background is in Microbiology having spent a placement year working in a clinical microbiology laboratory and then completing a PhD in the field. The decision to undertake a PhD wasn't solely down to my love of the subject and the opportunity to study it at a higher level, like a lot of people, I hadn't really decided what I wanted to do! My PhD, entitled '*The Characterisation of Propionibacterium acnes*', focused on the pathogenic potential of organisms isolated from different sources / infections in terms of their phenotypic and genotypic properties. The three very enjoyable years spent working towards a PhD gave me many skills that I feel I wouldn't have had as a graduate entering the job market. I'm not just talking about those such as knowledge and laboratory skills, but project management, organisational skills, team working, communication skills and problem solving. I feel that it is often difficult to find a career in exactly the same area as one's PhD subject as the nature of a PhD is very focussed study, so having these additional transferrable skills is essential. After my PhD I spent a year as a Medici Fellow (http://www.midlandsmedici.org). This is a programme which aims to improve the awareness of, and support for, commercial development of research within Universities by training fellows in enterprise and entrepreneurship. As well as receiving extensive training in knowledge transfer I also had the opportunity to work in the laboratory on proof of concept for an exciting new technology.

Having experience of working in academic research and being involved with the commercialisation of such research, I thought the next logical step in my career would be into industry; which brings me to my current position.

The requirements for this position include a PhD and/or relevant work experience and management experience. Luckily my PhD studies addressed the first two requirements as I had experience of some related technologies. I also had some management experience through managing final year project students during their research projects.

So what does a Raw Materials Manager do? The role shares aspects of that of a production manager except I deal with all the pre-production materials rather than the manufacture of the final products. I work closely with members of my team and the production manager. However, I also liaise with numerous other areas across the company such as purchasing,

marketing, quality assurance and technical services.

I would say the move from an academic laboratory to industry was a bit of a shock initially. It was much more regimented than I was used to with set hours of work and I found the amount of responsibility a little daunting. Suddenly I was in charge of a team of people and was responsible for an essential part of the production process. However, the steep learning curve was quickly overcome and now I successfully manage a team of six scientists who screen various components to ensure that they, and those from external suppliers, meet stringent quality standards (the laboratories are ISO9001:2000 and FDA certified) before they progress to the next phase of production.

A typical day normally starts by ensuring my team understand what they are doing from the schedule I produce. I then normally spend a period of time answering emails, many of which are from external suppliers whom I deal with constantly to secure the necessary raw materials. This part of my job also involves setting and managing a budget, stock control and forecasting, as I have to ensure everything is in place ready for production. I will meet with other managers from production, production support and R&D where we update each other on current issues. These issues are discussed and all necessary actions are agreed. I will then go through the results and paperwork generated from my teams' work so far that day. Paperwork is a very important part of my job and checks and processes are in place to ensure we are working to standard. After analysing the results and checking paperwork, I will then decide on the work that is required next. This process is time-consuming as each person in the team is often working on a different project, thus generating six sets of paperwork! Other tasks may then include any staff issues e.g. drawing up training plans, interviewing, appraisals etc; writing product or process changes required to optimise the manufacturing process; investigating alternative sources of material to improve efficiency quality; reading and writing technical documents to maintain relevant records and other administration. Again, a second wave of paperwork will then come my way as the afternoon's results are generated. As different products come up on the production schedule or a new raw material is sourced, the schedule needs to be flexible so at the end of the day this is updated, which involves constant prioritisation to meet production deadlines.

This job requires someone who is accurate and thorough, with an eye for detail. The ability to communicate effectively with people at all levels, have excellent organisational skills, a methodical approach, analytical and problem solving skills, are a must. One of the most important skills is the ability to make decisions and work to deadlines.

Although my job can have its fair share of stress, when deadlines are becoming a little tight, I enjoy the challenge of getting components produced as smoothly as possible, to the right quality and at the right time. It is satisfying to see these in the final products that will go into the hands of our customers.

Deneen Holohan

I graduated from University in 2004 and gained a 2:1 with honours in Biological Sciences. I studied a wide range of modules so as not to pigeon-hole myself because I wasn't sure exactly what I wanted to do. My parents always encouraged me to "get as many pieces of paper" as I could so I chose to gain qualifications in my favourite subject and worry about what I'd end up doing later on. I was willing to move away from my home town to start my career and that brings me to Birmingham where I work for The Binding Site as a Research and Development scientist, in the Enzyme-Linked Immunoabsorbent Assay (ELISA) department.

My first role here was in Production, where I manufactured autoimmune and functional diagnostic kits to tight QC criteria. This involved using in-house controlled samples to set calibration and positive and negative controls within given ranges. Each kit can be used worldwide by clinicians as diagnostic aids in disease. I now manufacture pre-production kits on a small scale and carry out new product development studies. These studies encompass performance characteristics for assessment of each new kit before it is approved by the quality assurance department, leading to its release on the market. The criteria are modified for each project in risk management meetings depending upon the nature of each new product, but the basics of the verification and validation process are the same for each new product.

I also work for the production support department, whose role it is to provide support to production. This includes investigations into the processes involved in kit manufacture, and may lead to their modification. In addition to this, studies are also carried out on specific reagents, for example ongoing stability trials of new fluids, so as to provide more information to improve the quality of the products.

Recently I have been given the opportunity to train a new member of staff. This has been quite difficult as it requires remembering the basics — a challenge as once you know the foundations it is difficult to remember what you didn't know before you started. I have thoroughly enjoyed training a new member of staff and I've found it very rewarding.

My role is varied and I can be working on a lot of different projects at the same time, which requires flexibility and good organisational skills. However, I love that aspect of my job; it certainly keeps me on my toes!

I am happy doing the job that I do and it gives me great satisfaction to do a good job and I enjoy watching my manager wonder what to give me next!

Concluding remarks

All areas of diagnostic product manufacture need development scientists capable of controlling the processes used to produce the final product with the aim of optimising the performance of manufacturing systems. There are many roles and entry is possible at all levels. The areas include research and development, production, production support, quality assurance, sales, technical services and marketing. All are involved in identifying and developing new processes for product manufacture and implementing process controls to ensure that quality products are manufactured in a responsible manner. Once inside the company, there are many opportunities to change your role or progress in the same area.

Alexandra Perry and Deneen Holohan

Making an

In the loop

pecs

News from the S*f*AM Post-Graduate and Early-Career Scientist Committee

As PhD students we experience a learning curve much like the exponential growth phase of bacteria. From reading and writing articles to performing experiments, we are very much like the microorganisms which we work on, searching and sequestering substrates (information). We become exceedingly efficient at this and right from the beginning develop a habit of cross feeding (networking). It has been stated, *"when it comes to networking, unless you're a born socialiser, it can feel like torture"* (Chandeler & Grzyb, 2007a) and developing this skill can be quite a challenge! Also, at some point we all present our work, an experience which itself can be very overwhelming. To sell ourselves we should *"convey a clear message, well prepared, with good audience interaction, presented with conviction and supported by the right technical backup"* (Chandeler & Grzyb, 2007b). Having good networking and presentation skills are great assets, so when I was offered a S*f*AM funded place to attend a communications training course arranged by Med-Vet-Net, I jumped at the opportunity.

The course was very hands-on, utilising practical exercises including role play, presentations and feedback sessions, all moulded to suit our individual needs. Day one was divided into three sections: the first dealt with communication dynamics, the second effective networking, and the third the art of being assertive and confident. Tips and techniques focused on body language and other non verbal expressions including assertive handshaking and the use of pleasant smiles to gain access to a group. A useful technique we learnt was to imagine our confidence as a dial from 1–10, which can be turned up or down depending on the situation. For

Summer Conference

Calling all postgraduate and early-career scientists! This year's summer conference will include a special student session, focussing on career options for microbiologists. The PECS committee will also be organising a pirate-themed social event, so remember to pack your cutlass and eye patch and join us for what promises to be an enjoyable evening, with a prize for the best fancy dress. Anyone failing to attend *WILL* be made to walk the plank! See you all there.

impact

example, if your confidence is low, try consciously turning up your dial - you'll appear assertive, professional and will be more successful in delivering your message. In another exercise we were asked to write down our perceptions of our communication styles and during feedback sessions we discussed these attributes. Doing this gave me clarity and brought me face to face with myself, an excellent exercise for self assessment and improvement.

Day two was even more interactive; we each gave a presentation and we were expected to make an impact in 30 seconds. The presentations were recorded and after watching the videos we each gave feedback. By doing this we gained a really useful perspective of our own presentations from the audience's viewpoint - a good way of improving our presentation skills. We were given tips on how to make maximum personal impact, along with advice about using images and considering the target audience to ensure the content of a presentation is attractive and enjoyable.

I would like to thank S*f*AM for providing access to this workshop, it was really informative and enjoyable and as a bonus we were provided with a DVD of our presentations to take away.

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Sumeet Kaur
London Metropolitan University

PECS News

Jo Heaton (Chair) and Andrew Hall (Secretary) have stepped down from their roles with the committee. We would like to thank them for their dedicated work in leading PECS through our first year. PECS is pleased to announce that George Aboagye (Chair) and Jess Rollason (Secretary) have been duly elected into these positions.

The summer conference is nearly upon us and this year PECS is organising the student session. Join us to hear about different career pathways in microbiology and have the opportunity to put your career questions to a panel of experts.

We hope to see you all there!

Vicki McCune
PECS Communications Officer

get involved

We would like to remind everyone that any contributions to this section are welcomed and can be sent to:

victoria.mccune@hpa.org.uk
gkaboagye@yahoo.com

Endangered Culture Collection Fund report

Dr Carlos Vallin Plous reports on the Cuban Culture Collection of *Streptomyces* from Cuban soils

The discovery of new microbial metabolites through screening is an expanding activity throughout the pharmaceutical industry and is becoming increasingly fruitful. There is widespread acceptance that microorganisms are a virtually unlimited source of novel structures with many potential therapeutic applications.

Advances in screening techniques and genetic engineering have improved the efficiency of the search for naturally derived products with pharmacological activity. Microorganisms are the preferred sources in many of the screening programmes. This is because microorganisms usually provide a broad diversity of compounds. They are easy to preserve and maintain in ex-situ conditions. Also, they can be cultivated in the laboratory to provide suitable cell mass for screening purposes and only require a small part of the in-situ population to be sampled. This means that the population still exists in the natural environment virtually unchanged, without significant reduction or lost of biological diversity at source.

The most prolific microbial source of known drugs is the *Streptomyces* group and related organisms. Cuba is a tropical island with ideal conditions for growing actinomycetes due to the temperature, climate and soil characteristics. Our soils remain almost completely unexplored for identification and isolation of actinomycetes, having a unique niche with a high potential for pharmaceutical screening programs looking for new lead drugs. In order to obtain a novel and diverse collection, soils are routinely sampled from different geographical areas and ecological habitats. The previous taxonomic work we have been performing has given us a starting point from which to investigate the feasibility for obtaining bioactive substances which would be of potential interest for developing new compounds.

Our Cuban Research Group has more than 15 years experience in the screening and the regulation of antibiotic production in *Streptomyces* from a basic and applied point of view. They have established the current screening and genetic methodologies of *Streptomyces* at the Laboratory of Biotechnology and have a culture collection of about 3000 *Streptomyces* isolated from Cuban soils, a natural resource which is practically undisturbed. These studies revealed the great diversity of secondary metabolites production (antibacterial, antimycobacterial, antifungal, antitumoral, HIV protease inhibitors, inmunomodulators etc) in our soils and from other geographic zones, indicating a high potential for screening programmes in the future.

Creating the National Collection of agricultural and industrially important strains is key to many of the above activities and the loss and poor management of many important cultures being of major concern. Without such a reliable genetic resource, the ongoing research of the Laboratory directed towards solving fundamental problems associated with physiology, biochemistry and genetics of actinomycetes was severely hampered.

The Cuban Culture Collection of the Centre of Pharmaceutical Chemistry was created in 1990. In the last two years one of the main problems and challenges facing the Culture Collection was the lack of reliable equipment for preservation of valuable micro-organisms. However, thanks to a grant of US$ 5,000 received from the S*f*AM Endangered Culture Collection Fund, we will now be able to safeguard these valuable cultures for the short to medium term at least. Now we can keep and maintain all industrially and agriculturally valuable micro-organisms. This will also facilitate much saving in labour and consumables, to which the grant will also make a significant contribution.

Dr. Carlos Vallin Plous
Laboratory of Biotechnology, Centre of Pharmaceutical Chemistry, Havana, Cuba

Students into Work Grant reports

information

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Bioluminescent bacteria as rapid reporters of preservative efficacy in cosmetics

Antimicrobial preservatives are routinely added to pharmaceutical preparations in order to prevent proliferation of contaminants and prolong the shelf- and in-use life of such products. Preservation efficacy is assessed by defined challenge tests against specific microorganisms. This approach traditionally uses time-consuming viable count procedures to determine whether the product is adequately preserved over its intended shelf-life (1). The incorporation of bioluminescent reporter bacteria into challenge tests has the potential to reduce labour and time costs as they would allow *in situ*, real-time determination of preservative efficacy. It is well documented that light output from bioluminescent reporters correlates with their metabolic activity (2) and, as such, measurement of light should provide a rapid, non-invasive means of collecting data on the antimicrobial action of potential preservatives.

The aim of this pilot study was to compare the currently accepted challenge test methodology with challenge tests carried out using bioluminescent bacterial strains. This work was in collaboration with Mr. Jean-Jacques Bourgois of the Institut Meurice, a technical college in Brussels, Belgium. Mr. Bourgois is also a consultant in the company Safe Biocare sprl which specialises in working with small to medium enterprises (SMEs) in the cosmetics industry. The project aimed to provide expert knowledge on the criteria required for appropriate testing procedures. It was hoped that these investigations would provide the necessary data for expansion to a larger project for the application of bioluminescent reporter organisms in high-throughput quality control testing.

The European Pharmacopoeia (2001) states that the antimicrobial activity of preservatives should be assessed in challenge tests which use prescribed inocula of suitable microorganisms, two of those being strains of *Pseudomonas aeruginosa* and *Escherichia coli*. Bioluminescent constructs of *P. aeruginosa* PAO1 (3) and *E. coli* (4) have already been used in studies of bacterial survival to antimicrobial challenge and their bioluminescence is known to reliably indicate the metabolic activity of these strains.

Briefly, the test consists of challenging the preparation with a prescribed inoculum of the bacterial strains, storing the inoculated preparation at a prescribed temperature, sampling from the container at specific time intervals and enumerating the organisms in the samples. The preservative properties of the preparation are adequate if, in the conditions of the test, there is a significant fall or no increase in the number of micro-organisms in the inoculated preparation. The criteria of acceptance, in terms of decrease in the number of micro-organisms with time, vary for different types of preparations according to the degree of protection intended. Challenging preparations with bioluminescent organisms allows real-time monitoring of their survival, *in situ* in the preparation container, using a low light level camera. Alternatively, samples can be withdrawn and light output determined using a single tube luminometer or automated plate reader. For comparison, samples can be plated out onto suitable media for viable counting as is currently prescribed.

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Debora Rubio-Aparicio

Biofilm production and susceptibility to antibiotics of anaerobic bacteria causing Cystic Fibrosis (CF) pulmonary infection

In CF patients the main cause of mortality is an irreversible decline in lung function caused by chronic bacterial pulmonary infection. Recent research carried out in Dr Tunney's laboratory has clearly shown by culture that the lungs of CF patients are not only chronically infected with pathogens, such as P*seudomonas aeruginosa*, but also by potentially pathogenic anaerobes such as *Prevotella*, *Veillonella*, *Propionibacterium* and *Fusobacterium*, which may also contribute to infection and inflammation. It is widely recognised that biofilm formation by aerobes such as *P. aeruginosa* within the CF lung contributes to the development of persistent chronic infection. Therefore, the aim of this project was to examine the potential of anaerobic bacteria to contribute to the development of chronic infection by examining their ability to form biofilms both alone and in combination with *P. aeruginosa*.

Initial experiments involved determining the ability of both aerobic and anaerobic isolates to form biofilms. Bacterial biofilms were grown in 96 well micro-titre trays using a method similar to that described by Stepanovic *et al.* Firstly, three *P. aeruginosa* isolates (PAO1, PAO-JP2 & 37G) were grown aerobically for 24 hours in three different media (nutrient broth [NB], tryptone soya broth [TSB] and basal anaerobic media [BAM]). The resulting biomass of the biofilm was then assessed using a crystal violet stain. Total viable counts were also performed by scraping the biofilms from the wells with a sterile pipette tip, diluting in phosphate buffered saline (PBS), plating out on *Pseudomonas* isolation agar (PIA) plates and counting according to the technique used by Miles & Misra (1938). For each of the media used, the optical density from staining with crystal violet did not correspond with the numbers of viable bacteria present. This may have been due to the fact that different media will affect the amount of polysaccharide produced in the biofilm, therefore giving a misleadingly high or low biomass compared to the corresponding viable count.

The same three *P. aeruginosa* isolates were then grown under anaerobic conditions in BAM, with the resulting biofilms having a lower biomass and total viable counts than those grown aerobically. This finding was not unexpected due to the less than optimal growth conditions. Two *Prevotella* isolates, *P. melaningogenica* and *P. intermedia*, were also grown anaerobically in the three different media (NB, TSB & BAM). The resulting biofilms showed optimal viable counts when grown in BAM and the poorest counts with NB. Therefore, in subsequent experiments, BAM was used as it gave good viable counts for both aerobic and anaerobic species. These initial experiments showed that both aerobic and anaerobic species were capable of forming biofilms when grown alone.

Further investigations focused on determining whether aerobic and anaerobic bacteria could grow together both planktonically and as a biofilm. Initial experiments involved growing a pair of clinical isolates, *P. aeruginosa* (37A) and *P .melaninogenica* (37G), which had been cultured from the same sputum sample, planktonically over a period of 24 hours in BAM, both alone and in combination. The viable counts of the isolates were determined by dilution in PBS and plating out, with the *P. aeruginosa* plated on *Pseudomonas* isolation agar (PIA) (incubated aerobically) and the *P. melaninogenica* plated on kanamycin-vanomycin laked blood (KVLB) agar (incubated anaerobically) and the combination plated on both PIA and KVLB. This allowed for the individual components of the combination to be counted separately. This experiment was also carried out using a combination of *P. aeruginosa* (37A) and *P. intermedia* (ATCC 25611). The results of these experiments were encouraging, with both anaerobic species growing well with the *P. aeruginosa* in combination (at least 100 fold increase in viable count for both anaerobes in combination over 24 hours). The *P. aeruginosa* both alone and in combination did not really grow but stayed at a similar total viable count over the 24 hours, possibly due to the anaerobic conditions. Biofilm formation by *P. aeruginosa* (37A) and *P. melaninogenica* (37G) grown alone and in combination was then determined. The wells of the microtitre tray were inoculated with either a culture of each isolate or both isolates growing in BAM and incubated anaerobically for 4 hours. Following this initial adhesion phase, the wells were washed, fresh basal anaerobic media added and the plates incubated for a further 24 hours. Following incubation, the supernatant was again removed and the plates washed. Adherent biofilms were removed by scraping and the total viable count of both isolates determined by serial dilution and plating on selective agars. Biofilm formation by both isolates was similar when they were grown alone and in combination.

In a further experiment examining mixed species biofilm formation, *P. aeruginosa* or *P. melaninogenica* were initially grown alone in the wells of a microtitre tray for 24hours and after washing the other isolate was added. Following a further 24 hour incubation period, adherent biofilms were removed by scraping and the total viable count of both isolates determined by serial dilution and plating on selective agars. Again biofilm formation by both isolates was similar when they were grown alone and in combination. Furthermore, establishment of a *P. aeruginosa* biofilm did not prevent the formation of a mixed *P. aeruginosa/P. melaninogenica* biofilm when *P. melaninogenica* was added after 24 hours and vice-versa. These results clearly indicate that *P. aeruginosa* and *P. melaninogenica* can form mixed species biofilms when added both simultaneously and sequentially 24 hours apart.

The final weeks of my placement were concerned with identifying matched clinical isolates (an aerobe and an anaerobe) from patient samples and doing preliminary studies into their ability to form biofilms both alone and in combination. All matched pairs tested were capable of forming mixed species biofilms.

This placement gave me the opportunity to build upon my knowledge of CF and vastly improve my

aseptic technique, as well as introducing me to many practical microbiological techniques, such as anaerobic culture and bacterial biofilm production. The work has also helped me to develop more general skills such as time management, organisation and more confident use of various computer programmes. I hope that I can use all that I have learnt for my M.Pharm degree. Furthermore, the work has encouraged me to think carefully about returning to research after undertaking my pre-registration year in community pharmacy.

Finally I would like to thank my supervisor, Michael Tunney, as well as S*f*AM as this placement would not have been possible without their generous funding. I am also very grateful for the help and advice of the students, research fellows and the technical staff I had the opportunity to work with.

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Katie Nixon

Marine picoeukaryote diversity

I am entering the third year of my Medical Microbiology and Virology BSc at the University of Warwick and was excited during my second year when offered the opportunity to benefit from a 10-week summer vacation placement at the University's Microbiology Research Group. The project aimed to study marine picoeukaryote diversity and support the research currently underway in this field. Marine photosynthetic

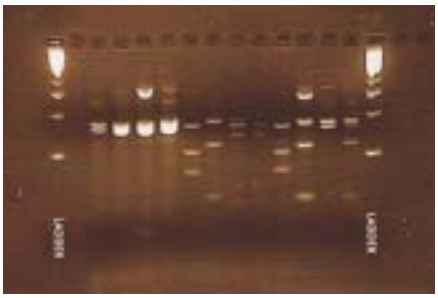

Figure 1. *RFLP patterns obtained following clone library construction of filtered seawater from the PAP site: Tracks between the markers represent a selection of PPE RFLP banding patterns*

picoeukaryotes (PPEs) are small (<3μm) ubiquitous organisms in oceanic waters that contribute a major proportion of the total carbon fixed by the phytoplankton community despite being present only in low numbers, usually between 10^3-10^4 cells ml^{-1} (Li 1994, 1995; Worden *et al.*, 2004). Unfortunately, the diversity of PPEs is poorly characterised and few if any organisms have been obtained into culture, and hence identifying the main 'players' responsible for CO_2 fixation is a key aim of research in the field. This is difficult, if not impossible, to ascertain solely by using morphological characteristics however, since few distinguishing cellular features exist between the various picoeukaryote lineages. Therefore, studies into diversity are carried out at the molecular level and organisms are identified using taxonomic gene markers. In this project I sought to use the plastid encoded 16S rRNA gene as a phylogenetic marker capable of resolving specific PPE groups, using restriction fragment length polymorphism (RFLP) analysis of PCR amplified products. The aims of the project were to assess the affects of sample collection on PPE diversity, using seawater collected from the Porcupine Abyssal Plain (PAP) sampling site (http://www.noc.soton.ac.uk/obe/PROJECTS/pap/) in the North Atlantic Ocean via the commonly used method of filtration, compared to using cells obtained by flow-cytometric sorting.

During the course of my project, I constructed a clone library from a filtered sample taken aboard the Celtic Explorer PAP cruise in 2007. From this library RFLP analysis was carried out and several unique ribotypes were identified, based on their banding patterns. Sequencing of these clones identified them as members of the class Haptophyceae, an interesting group of phytoplankton that include organisms capable of producing calcified plates or coccoliths. Significant species diversity within this group was observed based on the sequencing data. The complete dominance of this algal class in the 2007 sample highlights the dynamic nature of the PPE community, since previous data collected from the same sampling site the previous year showed Haptophytes to be much less dominant.

In collaboration with colleagues at the National Oceanographic Centre, University of Southampton, samples were also flow cytometrically sorted into 1000 and 10,000 cell aliquots for construction of clone libraries. This required precise extraction of DNA from such small cell samples. This was finally achieved with the 10,000 cell sample and clone library construction was completed. This work is being continued by a postdoctoral researcher in the laboratory.

Certainly, this summer vacation project has proven invaluable to my learning experience and the research career I now wish to pursue. The ability to gain first hand experience of so many techniques and apparatus in such a short space of time with an enthusiastic team is an opportunity I would not pass up if offered the chance again. I would like to thank Ludwig Jardillier and Amy Kirkham of the University of Warwick for their constant humour, guidance and patience, Ross Holland of the National Oceanographic Centre for showing me the dark art of running a MoFlo flow cytometer, and Dr. Dave Scanlan for offering me the opportunity to study this project under his supervision. I also wish to thank S*f*AM for making this project possible.

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Michael McNicoll

President's Fund reports

information

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If you often find difficulty in funding attendance at meetings. It is not only our student members who require our help. Senior microbiologists often find difficulty in funding attendance at meetings. If you are in this position you are eligible for this fund.

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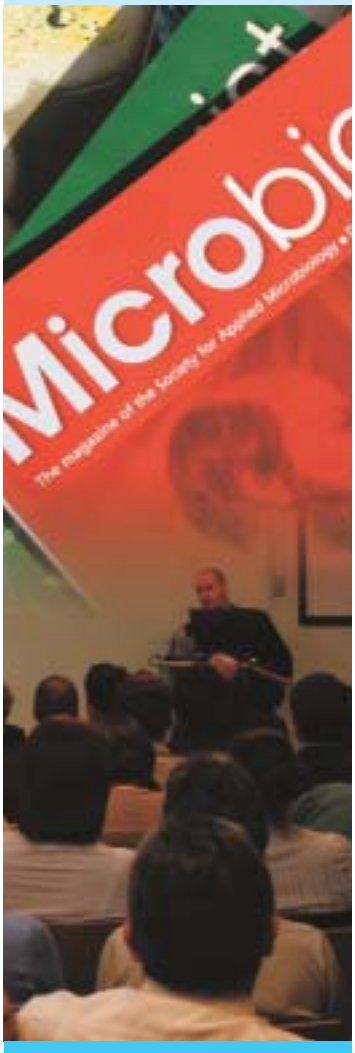

Disinfection of grey water for reuse

Water recycling is garnering interest as a potential solution to water shortages in the South East of England. With the highest per capita water consumption outside London and some of the UK's lowest rainfall, water supply is under stress in the South East. There are also concerns about the future sustainability of the region's water supply. Climate change is predicted to lead to a reduction in groundwater recharge upon which the region relies for 90% of its source water (Environment Agency, 2004). High density housing developments of more than half a million homes in the region over the next twenty years will lead to greater demand for water, both from the construction industry and from an increased regional populace.

The use of water recycling, particularly as part of new build developments, is a potential means of reducing domestic water consumption to alleviate the stress on water supply. Domestic grey water is a potential source of water for recycling. Grey water consists of all domestic waste water, excluding toilet waste water. For the purposes of reuse, grey water from the bath, shower, and hand basin are sufficient sources. Approximately one third of the water supplied to households is used for bathing and one third for toilet flushing; therefore water savings of up to 30% may be achieved by reclaiming grey water for toilet flushing alone (Diaper *et al.*, 2001). Other end-use applications for recycled water can include garden irrigation and car washing.

An important issue for water recycling is the potential for transmission of pathogenic microorganisms. Aerosols, formed from water recycling applications such as toilet flushing or garden irrigation can potentially harbour and transmit pathogens from the recycled water. Inhalation or accidental ingestion of recycled water are likely routes of transmission. Adequate disinfection of recycled water is therefore essential to minimise the risks of pathogen transmission. Currently, there are no national standards or guidelines in the UK for urban water reuse. In the United States, California State offers some of the most stringent standards for unrestricted urban reuse worldwide, of less than 2.2 total coliforms per 100ml, as a 7 day mean.

My research at Cranfield University has involved investigation of the microbiological quality of real grey water, collected from specially plumbed student flats on the Cranfield University campus, and assessment of technologies for grey water treatment and disinfection. Treatment technologies evaluated for microbiological treatment performance included a membrane bioreactor (MBR) and three configurations of constructed wetland. Chlorine and ultraviolet light were investigated as disinfectants. The work particularly focussed on the effect of grey water quality on disinfection, with an aim to inform treatment requirements of recycled grey water. Chlorine, as a widely utilised and well known disinfectant, is a leading contender for recycled water disinfection. However, poor water quality is known to limit the efficacy of chlorine disinfection. Particles in waste water have been shown to shield attached microorganisms from chlorine (Dietrich *et al.*, 2003) and the presence of organics is reported to increase the resistance of microorganisms to chlorine disinfection by stabilisation of the cell membranes, restricting access of chlorine to key cellular components for inactivation (Virto *et al.*, 2005).

In order to investigate the impact of particles and organics on chlorine disinfection, grey water was manipulated in terms of particle size distribution and organic concentration. Particle size distribution was altered by a simple settling process, while a synthetic grey water concentrate was used to manipulate organic concentration. Further investigation of particle shielding involved the use of a blender to shear particles and release particle-associated microorganisms.

Total coliform survival was greater with increasing particle size in chlorinated grey water. Chlorine is able to penetrate particles by diffusion to inactivate particle-associated microorganisms. Increasing particle size in grey water provided greater protection to associated coliforms due to the longer diffusion path for chlorine to the particle centre. Greater initial chlorine concentrations and longer chlorine contact times were found to

improve particle penetration and inactivation of total coliforms in grey water. Experiments indicated that initial chlorine concentration and contact time can be tailored to a waste water of a particular particle size distribution to achieve a desired level of particle penetration and coliform inactivation. The particle characteristics are also be important, with particle porosity and composition affecting the rate of chlorine transport into particles.

An important consideration is the number of microorganisms shielded within an individual particle. Standard coliform enumeration techniques, such as membrane filtration or most probable number (MPN) method, will record one particle, containing any number of particle-associated coliforms, as one coliform or colony forming unit. This can lead to an underestimation of the actual numbers of microorganisms present in a water sample and increases the potential for pathogen regrowth following disinfection. Blending of chlorinated grey water samples increased total coliform counts by up to nine times, demonstrating that particle-associated coliforms in grey water are highly resistant to chlorine disinfection and that particle associated pathogens are a concern for grey water recycling. Organics in grey water conferred no additional protective effect to coliforms, providing the additional chlorine demand was met.

It is important that grey water treatment technologies target suspended solids removal to ensure removal of particle-associated microorganisms prior to disinfection. The constructed wetland and MBR treatment technologies tested, effectively removed 70% or more suspended solids from grey water, preferentially targeting the larger sized particles and reducing the mean particle size from around 500µm to 5µm. Removal of organics also gave a reduction in chlorine demand. An initial chlorine concentration of 80mgL^{-1} provided incomplete inactivation of total coliforms in the raw grey water, while complete inactivation of total coliforms in 100ml was achieved at a concentration of less than 1 mgL^{-1} in the treated effluents.

Grey water recycling is an effective means of reducing water consumption, however, appropriate treatment and disinfection steps are essential to ensure minimal risks to end users.

I am very grateful to S*f*AM for their generous President's Fund award, which enabled me to present a paper at the Disinfection 2007 conference in Pittsburgh, USA.

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Gideon Winward

Ensuring the efficacy of disinfectants used in hospitals

Hospital cleanliness is under great scrutiny, fuelled by the regular, and sometimes sensationalist, media coverage of hospital-acquired 'superbugs'. At the time of writing this article our hospitals have come under fire once more with reports that one in four NHS Trusts are failing government targets on cleanliness and tackling the superbug problem (http://news.bbc.co.uk/1/hi/health/6757355.stm).

One of the principal protagonists is *Staphylococcus aureus*. Healthcare acquired infections (HAIs) caused by methicillin-resistant *S. aureus* (MRSA) are associated with increased patient mortality and morbidity and prolonged lengths of hospitalisation which add to the overall costs of care and burden on the NHS (Gould, 2006). It is also important to remember that methicillin-sensitive *S. aureus* (MSSA) are a significant cause of HAIs. Myriad studies have reported on the ability of these organisms to contaminate and persist in the hospital environment. *S. aureus* can be readily cross-transmitted from hospital surfaces onto the gloves and gowns of healthcare workers (Boyce *et al.*, 1997) and there is evidence suggesting that hospital equipment has been the direct source of MRSA outbreaks (Schultsz *et al.*, 2003). Effective cleaning, coupled with the deployment of disinfectants have been advocated as crucial infection control measures (Coia *et al.*, 2006). We pose the question: are we confident that these organisms are susceptible to the disinfectant agents being applied in our hospitals?

Disinfection regimens adopted in intensive therapy units (ITUs) and other healthcare facilities in Wales include the use of antimicrobial wipes. Wipes employed to disinfect surfaces proximal to patients (e.g. bed rails) and those commonly touched by staff and patients (e.g. tables, keypads) may act as sources of cross-contamination. It is therefore essential that wipes are effective in removing and killing potential pathogens from these surfaces.

Claims of efficacy, such as 'kills MRSA', are ubiquitous on the packaging of disinfectant wipes. However, it is questionable whether manufacturers use appropriate efficacy tests to test their products in conditions mimicking usage in practice. Standard methods, based on the antimicrobial diffusion from textile fabrics, where the efficacy of the wipes is determined on the appearance of an inhibition zone around wipe specimens (International Standard ISO 20645, 2004) are currently used. Other wipe manufacturers' have validated the formulation which is applied to the wipe with a suspension test. Suspension tests involve mixing a known concentration of bacteria into a solution of the antimicrobial formula and examining the reduction in bacterial numbers. Such methods may be useful to identify whether the antibacterial ingredient of wipes is active against the target bacteria, but they do not reflect usage in practice. Ultimately we feel that they may be inappropriate since they do not assess the ability of wipes to *actually* disinfect contaminated surfaces.

In light of this concern, we have developed a reproducible 3-step protocol to evaluate the disinfection efficiency of wipes; their ability to remove, and prevent the transfer of

Figure 1. *Step-1 of the new protocol examining the ability of disinfectant wipes to remove microbial contaminants from surfaces. Wipes are placed in contact with surfaces and mechanically rotated.*

Figure 2. *Step-2 of the protocol examining whether disinfectant wipes can transfer microbial contaminants. Following the application of wipes to contaminated surfaces, agar plates are consecutively inoculated by pressing the wipe onto their surface.*

microbial contaminants from surfaces, and their overall antimicrobial activity. In our initial study, we used both the standard agar diffusion test (International Standard ISO 20645, 2004) and our novel 3-step protocol to test the efficacy of grapefruit extract-containing disinfectant wipes against MRSA and MSSA strains which caused bacteraemias in South Wales ITUs. According to the guidelines of the agar diffusion test the wipes had a "good" antibacterial effect since they produced zones of inhibition on MRSA and MSSA lawns.

For the first step of the new protocol we mechanically rotated wipes against surfaces contaminated with *S. aureus* (Figure 1). The parameters of these tests (i.e. contact time, wipe application speed, the pressure applied to surfaces) were chosen following the observation of staff using the wipes in ITUs, thus reproducing *in situ* usage. We found that the antibacterial test wipes achieved a significantly higher bacterial cell removal ($P < 0.05$) than unmedicated control wipes. Step-2: Following the application of wipes to surfaces we measured bacterial transfer from the wipes by consecutively inoculating 8 agar plates by pressing the wipes onto their surface (Figure 2). We observed how uncountable high numbers of each strain were consecutively transferred from both the control and test wipes. Step-3: we measured the bactericidal activity of disinfectant wipes by directly inoculating them with *S. aureus*. Following the exposures, the wipes are transferred to neutralizer and viable cell counts performed to enumerate the number of survivors. We found that the test wipes had a limited antimicrobial effect, producing less than 1 log reductions.

Overall, our results suggest that if these wipes encounter similar contamination levels in practice, the subsequent survival of bacteria on the wipe material could potentially lead to the cross-contamination of other surfaces. It is also perhaps alarming that this particular brand of wipe is marketed as being able to 'kill' MRSA. We are currently evaluating the efficacy of alternative wipes and comparing their performance.

In our opinion, the standard agar diffusion test is too subjective and grossly overestimates the activity of wipes. More complete tests which mimic the conditions and the way wipes are applied *in situ* are more appropriate for evaluating their efficacy in practice. We have devised a simple, rapid, robust and reproducible method which could be a useful tool for future assessment of the ability of wipes to disinfect surfaces. The development and use of appropriate protocols is important to reassure end-users that products meet the claim of efficacy when they are used according to the manufacturers' instructions. We have initiated a surveillance programme of MSSA/MRSA susceptibility to disinfectants used in ITUs in Wales. Overall, this approach should promote the rational and evidence-based use of these agents in the healthcare environment. In addition, assuring the public that control measures are being carefully scrutinised would undoubtedly be beneficial.

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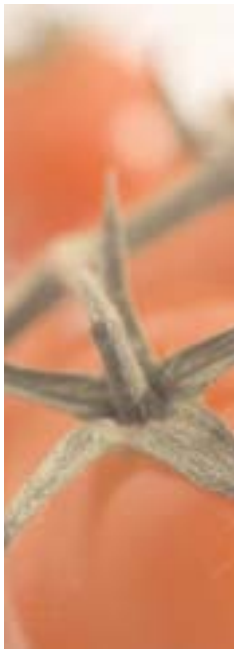
Cardiff University

Join the Washing and decontamination of fresh product forum at CCFRA



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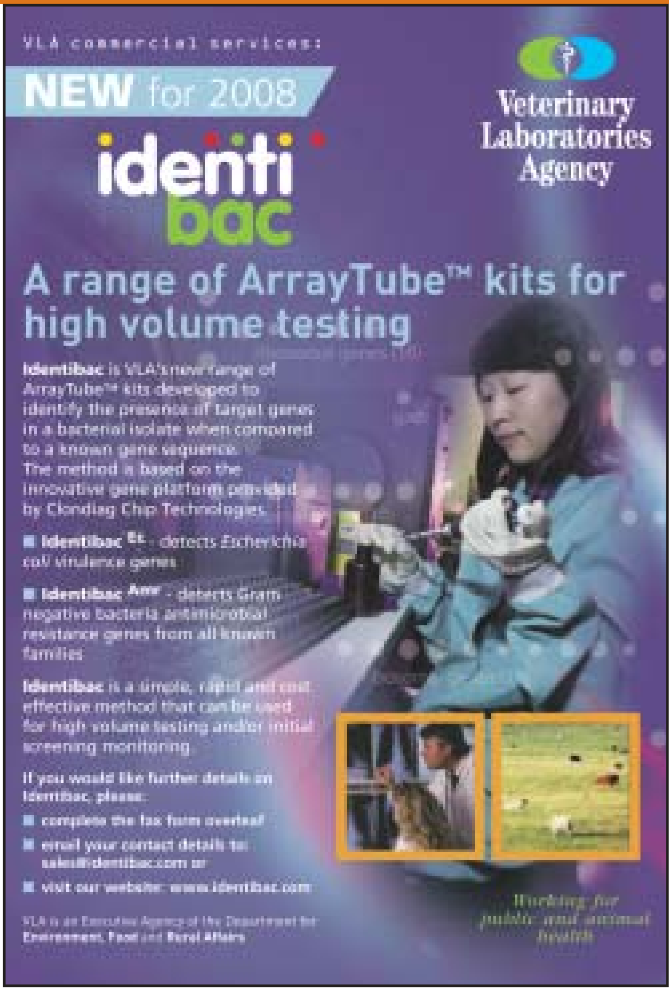
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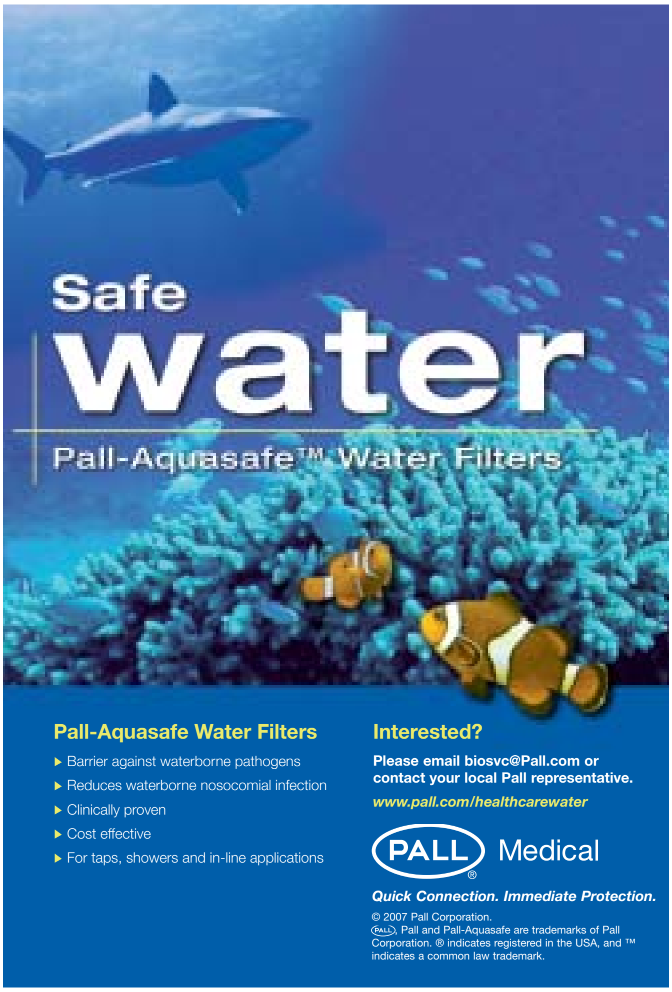
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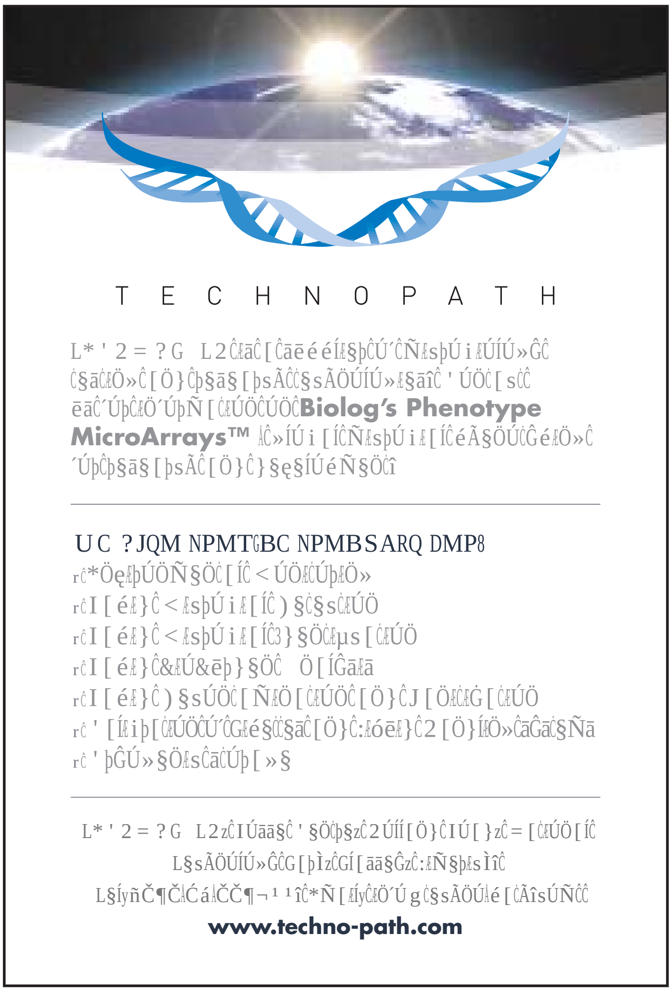
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A new French Connection

Plastiques GOSSELIN, one of the pioneers of single use laboratory products and now one of the leading manufacturers in the world, have recently joined *Sf*AM as a corporate member.

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At the headquarters and principle manufacturing site in the North of France over 20,000 square meters of state of the art production facility produces more than 5,000 products. Quality is paramount throughout the manufacturing process and is maintained by a dedicated quality team making hundred's of checks per day per production line according to an ISO 2001 Quality System.

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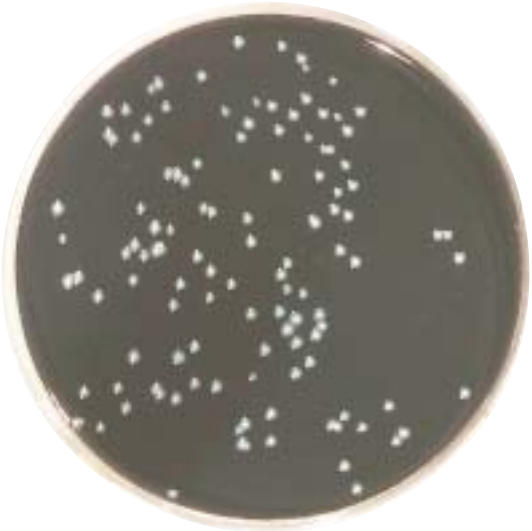

Legionella isolation medium used for water samples

2 May 2008; Bury, UK: *Legionella*-related deaths continue to hit the headlines around the world, with recent cases linked variously to shower heads, hot tubs and cooling waters. With water monitoring playing an important role in controlling legionella, Lab M's BCYE (buffered charcoal yeast extract) Legionella Isolation Medium is finding increasing application. It is used particularly for water samples concentrated by membrane filtration or centrifugation.

The medium is based on the charcoal yeast extract formulation of Feeley *et al,* with the addition of ACES (N-2-acetamido-2-aminoethane-sulphonic acid) buffer and α-ketoglutarate for enhanced performance. It is detailed in internationally recognised methodology for the isolation of Legionella species from water samples. A range of selective supplements, used in conjunction with heat and acid treatments, aid isolation from water heavily contaminated with other bacteria.

further information

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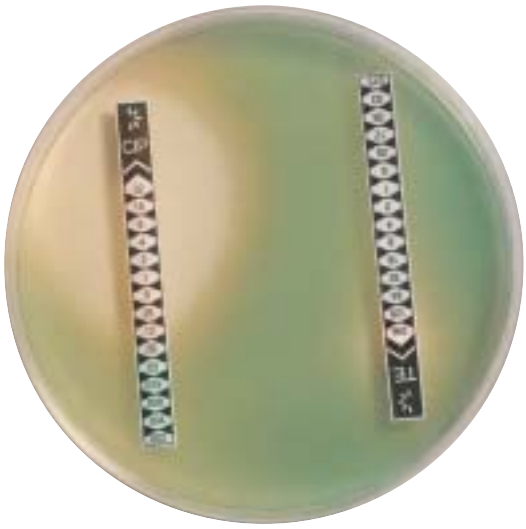

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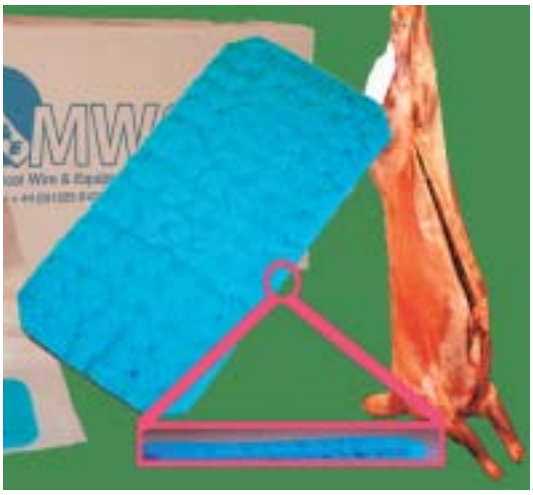

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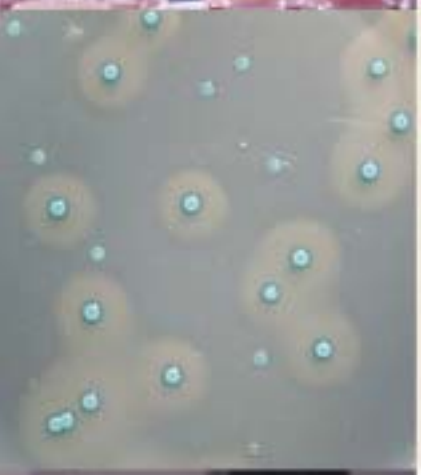

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