

Where N_t is the number of organisms at time t (cfu or pfu /g DS); N_0 is the number of organisms at time zero (cfu or pfu /g DS), e.g. at the start of pan filling; DC is the organism-specific decay coefficient (determined from regression analysis); t is time t (days).

For example, the decay of bacterial indicators and pathogens in a drying-pan simulation are shown in Figure 2. This indicates that *Salmonella* Typhimurium decays at a higher rate compared to both *E. coli* and *Enterococcus* spp., with decay coefficients of -0.149, -0.007 and -0.03, respectively.

Forecast of treatment times in pan-drying to reach treatment grades T1, T2 and T3

The decay coefficients of pathogens and indicators in both field treatment and laboratory simulations were used to calculate the times required for their decay according to current regulations. Both average and worst-case data was used to forecast treatment times for verification to provide T1 grade biosolids.

Both for average and worst-case data the forecast treatment time for verification to provide T1 grade biosolids in pan-drying is about 59 weeks. Therefore, treatment times could be reduced to about one year, with no requirement for storage, compared to the current regulatory requirement for three years' storage.

Risk analysis

Although most potential pathogens are either absent or present in low numbers in raw sludge in developed countries, it is still important to model the microbial pathogen risks associated with the application of treated sludge to land. We therefore developed a model to follow the decay of nine pathogens in sewage sludge treatment from estimated levels in the human the infected human population through to annual exposure from ingestion of uncooked root crops grown in biosolids amended soil⁴.

Under typical conditions, the risk of infection from pathogens in conventionally treated biosolids was below the 10^{-4} pppy USEPA limit for drinking water⁵.

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ASM Affairs

Science meets Parliament 2012

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An annual event of growing importance and popularity for both the scientific community and the federal government is Science meets Parliament (SmP). SmP is promoted and presented by Science and Technology Australia (www.scienceandtechnologyaustralia.org.au), a scientific advocacy group of which ASM is a member, bringing together scientists of all disciplines from across Australia for a unique opportunity of interactions with our federal parliamentarians in Canberra. This year, at the 13th annual SmP event, the ASM was represented by Assoc. Prof. Damian Purcell (University of Melbourne) and Dr

Nick West (University of Queensland). On the first day of the two-day event, delegates participate in a series of workshops aimed at informing and equipping them to interact more effectively with members of parliament. A strong theme of these workshops is about the value of science communication, budgetary processes, formulation of policy and how to influence it. Changes in the media have resulted in the culling of several dedicated science journalists and delegates were encouraged to embrace social media, such as Twitter, to keep science in the national conversation and to guide important policy discussions. There

was also a very strong emphasis on how to communicate with politicians, which is something quite foreign to most scientists. SmP 2012 attracted 220 delegates, a record level of attendance at this event. Matching this enthusiasm was that of Canberra's MPs, with some 70 parliamentarians choosing to meet personally with scientists throughout day two. These meetings would mean that delegates would enjoy a unique opportunity to not only discuss with parliamentarians their work but also to pitch an "angle" or concept or to just discuss the importance of continued and stable funding.

A lasting impression for me was the sense from many of those in Canberra that science is important, and somewhat surprisingly, that scientists attract a great deal of respect for their efforts. What was also obvious was that politicians wanted and needed to understand science, at least the basics of what we are trying to do and achieve. There were several occasions where the importance of appropriate communication was impressed on us, mostly in terms of the language that we use. It is clear that MPs understand one language whilst scientists are speaking a completely different one. Prof. Brian Schmidt of the ANU and winner of the Nobel Prize for Physics 2011, summed it up best at his National Press Club Address with, "Scientists often have the notion that scientists are from Venus, politicians from Uranus", while politicians have the view we scientists are just off the planet. It was stressed that scientific communication skills with non-scientists needs attention. So a lesson learned for us as members of the ASM is to not be reluctant in approaching our federal members, but to get the language right so there can be a meaningful dialogue and a sense of inclusiveness, dare I say, partnership. After all, these people are the policy makers, of policies that have huge potential to affect our work, careers and the outcomes for the country.

A common theme from the Canberra policy makers was the increased stress on the federal budget that is threatening future funding for science and research. Adam Bandt, deputy leader of the Greens and MP for Melbourne asked the Treasurer, Wayne Swan during question time, with a gallery packed with SmP delegates about the government's position on a rumoured freeze on new science funding that would see the flow of new NHMRC and ARC grants and fellowships delayed until July when the new financial year starts. This rumour was a talking point for many delegates conscious of the extreme push for a surplus budget ahead of the next federal election. While the answer from the Treasurer, Mr Swan, acknowledged the importance of science and research and previous increases in the budget, his lack of clarity in answering the meat of the question gave SmP delegates in the gallery a sharp example of the difference between scientific precision and political obfuscation. In the big picture, annual science and research spending of \$9 billion is only 1.4% of a

total budget of \$365 billion. So the savings required to bring the budget into surplus will have to target big budget items like social security, health, education and defence to find the \$42 billion in savings required.

Delegates met with politicians who selected them from their biographies. Nick West met with the Hon. Mrs Jane Prentice, MP for Ryan, a Brisbane metropolitan electorate. This meeting was particularly relevant for Nick as UQ lies within this electorate and attracts her attention. Her knowledge of research undertaken at UQ across many different fields was impressive and encouraging. Nick discussed deficiencies in attention to tuberculosis (TB) generally and its importance to the state of Queensland, in an environment of closing treatment facilities and decentralisation of services relating to TB. A lot can be learned from past parliamentary speeches delivered by MPs and in at least one example Mrs Prentice went on record defending the need to maintain ARC funding.

Damian Purcell met with the Hon. Richard Marles, MP for Corio the electorate hosting the Australian Animal Health Laboratories (AAHL) of the CSIRO. He is also Parliamentary Secretary for Pacific Island Affairs and for Foreign Affairs, and holds a BSc and LLB degrees. He is also the founding co-convenor of the Parliamentary Friends of Science group that includes 45 MPs that seeks to establish a meaningful dialogue between scientific leaders and parliamentarians who are seeking expert advice to guide policy. Damian was asked about the current state of the HIV epidemic locally and in regional Indigenous communities, and about scientific advances in treatment and biomedical prevention products, such as an effective preventive vaccine. The Hon. Richard Marles was quick to understand the importance of allowing good science to guide an effective response to the HIV epidemic, and also strongly supported the important role that AAHL played in counteracting new infectious threats to Australia and our region. Also meeting with the Hon. Richard Marles was Dr Alex Maier, a malaria researcher from ANU, who was able to answer numerous detailed questions about Australian and regional malaria infections. This meeting underscored the need for scientifically accurate information by our MP policy makers and the important role the nations' scientists play in proactively and efficiently feeding high-quality and understandable information to our politicians.

Politicians with a thirst for our stories are out there; there is support for us in Canberra, but they need to be engaged. We would encourage members to identify your federal MP, find out what they are into, and make contact. Let them know you are there and doing something worthwhile, invite them to your workplace and you never know, they might one day be lobbying on your behalf.

Zoonoses Conference 2012

University of Sydney, NSW, 27–28 July 2012

It is often said that veterinarians and doctors have much in common. With recent figures suggesting that zoonotic diseases account for more than 70 per cent of emerging infectious diseases worldwide, there has never been a more pressing time to promote collaboration between human and animal health care professions.

In an Australian first, infectious disease physicians, veterinarians, public health officials, environmental scientists, pharmacologists and parasitologists were among the delegates at the Zoonoses Conference 2012 at the University of Sydney.

The conference, hosted by the Australian Society for Infectious Diseases (ASID) in collaboration with the Australian Veterinary Association (AVA) and Sydney Emerging Infections and Biosecurity Institute (SEIB) was prompted by previous discussions at the ASID antibiotic resistance summit in February 2011.

Antibiotic resistance was certainly a major theme, with extensive discussion about improving antimicrobial stewardship in both human and animal health spheres. Professor Tom Riley, from the University of Western Australia, discussed the recent dramatic

rise in community-acquired *Clostridium difficile* cases, and raised concerns that the use of third-generation cephalosporins to treat human patients for viral respiratory disease as well as their use in food producing animals may be behind the increase.

Other speakers on this topic, including Associate Professor Tom Gottlieb, Professor Mary Barton, Dr Steven Holloway, Dr Celia Cooper, Professor Peter Collignon and Professor John Turnidge, engaged in a vigorous panel discussion on the topic, suggesting that increased scrutiny and regulation of antimicrobial use is warranted.

Highlights of the first day included discussions of what veterinarians and doctors have in common, by Professor Chris Baggoley, Chief Medical Officer for Australia and a former veterinarian, and Dr Mark Schipp, Chief Veterinary Officer. Professor John MacKenzie explored different applications of One Health, while Taronga Zoo's Frances Hulst presented a case report of an elephant with tuberculosis and explained the logistics of collecting appropriate microbiological samples and



medical management. The latter was no mean feat, with the patient requiring a daily suppository and 120 tablets per day.

Drs Stephen Graves, Katrina Bosward and William Pratt, together with Associate Professors Anthony Allworth and Claire Nourse, provided new information about Q fever including analysis of the Netherlands outbreak, the largest recorded outbreak to date. Delegates learned that at-risk populations including persons living within the vicinity of farms, as well as dog and cat breeders who may be exposed during the animal's periparturient period.

The day closed with a discussion on Hendra virus, with Drs Hume Field, Rick Symons, Deborah Middleton and Geoffrey Playford providing insights into epidemiology, outbreak response strategy, equine vaccination development and treatment using monoclonal antibodies.

The second day commenced with a fascinating, if disturbing, insight into food safety in Australia. Dr Jenny Robson discussed current limitations in laboratory diagnosis of food-borne zoonoses such as *Campylobacter*, while John Bates provided an insight into the use of microbiology and molecular markers in investigating food-borne outbreaks. It became clear that when it comes to food hygiene there remains room for improvement. Professor Nigel French and Dr Rowland Cobbold provided perspectives on campylobacteriosis control in New Zealand and EHEC isolation during the recent German outbreak respectively.

Delegates were reminded of their personal role in infection control during a session on infection control and occupational hazards in human and veterinary settings. Drs John Ferguson and Navneet Dhand gave accounts of infection control in human and veterinary hospitals respectively, suggesting that while we are doing well, we can do much better. Consistent hand hygiene remains one of our best weapons against the spread of infectious disease in these settings. Dr Claire Dendle discussed the varied infections associated with bite wounds inflicted by various species, including humans.

Avian influenza was the key topic covered in the session on management of emerging disasters, with Dr Jenny-Ann Toribio and Associate Professor Allen Cheng given perspectives on the veterinary and human aspects of the H5N1 pandemic.

The final session, on animals as sentinels for human diseases, covered cryptococcosis, *Mycobacteria ulcerans* and *Francisella*

tularensis – all reported in human and animal patients within Australia. Associate Professors Mark Krockenberger and Sharon Chen, along with Drs Carolyn O'Brien and Alistair McGregor, provided insights into the challenges of monitoring animal populations for diseases with zoonotic potential.

A total of 43 posters, covering topics ranging from toxoplasmosis, leptospirosis, Lyme borreliosis and rabies, were on display. Four presenters were selected to give a brief oral presentation. University of Tasmania paramedic Janelle White discussed the B.I.T.E.S. tool, developed for assessing and triaging bite wounds inflicted by a range of species including humans. Murdoch University small animal medicine specialist Peter Irwin discussed the implications of the discovery of zoonotic babesiosis (*Babesia microti*) in Australia. The patient, who had serious comorbidities and died of multi-organ failure, had no relevant travel history outside of Australia and no history of injecting drug use or blood transfusions. A tick vector is suspected. Katherine Bond, from the Department of Infectious Disease at St Vincent's Hospital in Melbourne, reported *Haycocknema perplexum*, a parasite found in myofibres, as an important differential diagnosis for myositis. The diagnosis can be easily missed on histological evaluation of muscle biopsy, and the disease exacerbated with administration of steroids. As the leading differential diagnosis is autoimmune inflammatory myositis, it is crucial to rule out *H. perplexum* before embarking on a treatment trial. Tim Gray provided a selection of case reports of zoonoses presenting to Concord Hospital Infectious Diseases Service, including psittacosis, bartonellosis, cutaneous larva migrans, hepatosplenic brucellosis and disseminated hydatid disease.

Organising Committee

Dr David Looke (ASID President), Professor Bart Currie, Associate Professor Tom Gottlieb, Dr Jenny Robson, Professor Tania Sorrell, Professor Michael Ward, Dr Richard Malik, Associate Professor Jacqui Norris, Professor Mary Barton, Dr Rowland Cobbold and Maggie Game.

Lee Hudek

The notification of being the recipient of the 2012 Millis-Colwell Award was very welcomed to say the least. Having just completed my PhD, the opportunity to present my research on metal homeostasis mechanisms in the cyanobacterium *Nostoc punctiforme* at the world's largest forum for microbiology was very exciting. The city hosting the 112th ASM general meeting was sunny San Francisco (until around 4 pm when the fog rolled in). The International Reception on the Sunday night was a great social gathering, where I got to meet Jessie Mclean, who did a brilliant job sorting out my conference registration and attendance, as well as the Chair of the International Board for the ASM Dr May Chu, who presented my 2012 Millis-Colwell certificate.

The presentation I gave was on the final day of the conference, Tuesday 19 June. It was fantastic to be able to promote my research titled "Cyanobacterial metal uptake mechanisms" to a broad group of microbiologists and have engaging conversations with a few researchers who I had been eager to meet, including Prof. Michael Summers and his research group. By the end of the Tuesday, my brain was as crammed with inspiring knowledge and all that was left to do was meet up with my host supervisor Prof. John "Jack" Meeks for our trip to Davis. Davis was home for the



The 2012 Millis-Colwell award certificate was presented by the Chair of the International Board for the ASM Dr May Chu at the International Reception.

best part of two months, where I worked in the Meeks laboratory at UC Davis.

The Meeks lab members were very welcoming, giving me the opportunity to do a presentation as well as hanging my poster from the ASM conference in the lab. I was very fortunate to be given the opportunity to work in the Meeks lab, the vanguard of *N. punctiforme* research. The research I conducted during my time in the Meeks lab was microarray analyses to determine what genes are involved in the preferential uptake of zinc over cobalt in *N. punctiforme*. Whilst undertaking the microarray, much help was provided by everyone in the lab. I was fortunate to have Dr Emiko Sano doing some array samples at the same time. As this was her first array, we were able to run through the steps together, with the ever helpful Dr Daniela Ferreira and Elsie Campbell guiding us through.

After the array was completed, I was able to get some firsthand experience doing tri-parental mating to transform *N. punctiforme*, as opposed to the electroporation method I typically use. I also was able to take advantage of having all the tools to establish over-expression constructs using specific plasmids for *N. punctiforme*. This will enable complementation in the knockout mutants that I had previously created.

Now back in Melbourne working in the lab at the Centre for Cellular and Molecular Biology, I am as enthusiastic as ever to continue my research on *N. punctiforme* using the newly acquired tools and techniques I brought back from the Meeks lab. I would like to thank the Australian Society for Microbiology for their continued support for my research and my supervisors, Prof. Leigh Ackland, Prof. Brett Neilan and Prof. Jack Meeks. I would also like to thank Janetta Stones and Jessie Mclean for their help and support, the ASM Millis-Colwell committee and the Meeks lab at UC Davis.

Culture Media SIG

Peter Traynor MASM, National Convenor

The Culture Media Special Interest Group (SIG) of the Australian Society for Microbiology was formed in 1991 by a group of interested individuals after an upsurge in interest in the issue of media quality and the appearance that no common standards or consensus existed in this area in Australia. Increased interest, especially amongst medical microbiologists, in what was being done, or should be done, by way of assuring the quality of microbiological media made the issue contentious.

The National Association of Testing Authorities (NATA) Australia was amongst those seeking guidance in the area of Media Quality Control, being in the position of accrediting microbiology laboratories in the fields of biological testing and medical testing. They found little in the way of consistency and knew of no locally applicable guidelines on which to base their assessments and recommendations.

A working party of the Culture Media SIG developed a set of guidelines, titled *Guidelines for Assuring Quality of Medical Microbiological Culture Media*, which were approved in September 1996. This document has been widely used over the past 16 years and has been acknowledged as a valuable resource by microbiologists in medical as well as food, water, and pharmaceutical laboratories.

The SIG's *Guidelines for Assuring Quality of Food and Water Microbiological Media*, and *Guidelines for Assuring Quality of Solid Media used in Australia for the Cultivation of Medically Important Mycobacteria* also form an integral role in accreditation and certification to relevant ISO standards. The Medical Mycology Guidelines will now add another aspect to this structure supporting good quality in media quality control and quality assurance.

The Food and Water guidelines' inclusion of both food and water media was the inspiration behind the decision of ISO committee TC34/SC9 to include water media in the relevant ISO 11133 standard (currently in press), and parts of the International Standard have been heavily influenced by the Australian predecessor ... from which we can draw great pride.

The existing three documents produced by the SIG and its members, posted on the website, and their referencing in NATA Field Application Documents for both Biological and Medical testing, has entrenched the importance of these documents to local certification requirements and are therefore recognised by NATA and Standards Australia as pivotal.

A major review of the medically related guidelines was completed in early 2012, and the rewritten second editions of both medical microbiological media and solid mycobacteria media

were submitted to the ASM's Clinical Microbiology Standing Committee (CMSC) for ratification in May. A third document, *Guidelines for Quality Control of Medical Mycological Media*, began in the late 1990s and almost finalised in 2001, was finally completed in 2012 and was also submitted to the CMSC for ratification.

The Chair of CMSC indicated approval by CMSC to ASM Executive on 26 June 2012. This was, in turn, acknowledged by the ASM President the following day. These three guidelines (medical media, solid mycobacteria media, medical mycology media) were launched to the ASM membership through the ASM National Office in August by direct email to Division 1 members, as well as to the SIG-listed members.

Revisions are currently in process on the Food and Water guidelines document, with the aim of having these revisions completed soon.

These four guidelines form a major interface between the Society and its members, as well as the broader – including international – microbiology community.

Australian influence and input into the new ISO Standard ISO11133 continues through ASM's input into Standards Australia – through the many ASM members involved in the Food Microbiology committee FT-035 – but also through Standards Australia having direct and active representation within the working party currently preparing the ISO 11133 document to its final stages, via the involvement of the current Culture Media SIG National Convenor.

Direct links to the latest guidelines developed by the Culture Media SIG are at:

Guidelines for Assuring Quality of Food and Water Microbiological Culture Media:

<http://www.theasm.org.au/assets/ASM/Guidelines-for-Assuring-Quality-of-Food-and-Water-Microbiological-Culture-Media-.pdf>

Guidelines for Quality of Solid Mycobacteria Media:

<http://www.theasm.org.au/assets/ASM/Guidelines-for-the-Quality-Assurance-of-solid-Mycobacteria-media-2nd-edition-July-2012.pdf>

Guidelines for Assuring Quality of Medical Microbiological Media:

<http://www.theasm.org.au/assets/ASM/Guidelines-for-the-Quality-Assurance-of-Medical-Microbiological-culture-media-2nd-edition-July-2012.pdf>

Guidelines for the Quality Assurance of Medical Mycology Media:

<http://www.theasm.org.au/assets/ASM/Guidelines-for-the-Quality-Assurance-of-Medical-Mycology-culture-media-1st-edition-July-2012.pdf>