

Vale

Kevin Marshall

1932—2010



Kevin Marshall: a pioneer in modern microbial ecology and founder of microbial biofilm research

Kevin Marshall, who was Professor and Emeritus Professor in Microbiology at the University of New South Wales (UNSW) and a very active and key member of the Australian Society for Microbiology, passed away in January this year and left behind a massive legacy.

Kevin was an exceptional scientist and discovered a particular pattern in the results he obtained from studies of microbial communities, across a range of different natural and engineered ecosystems. He observed that dominant and key features of the microbial processes he monitored were associated with interfaces and, in contrast to what was believed at that time, proposed that microorganisms do their things best at surfaces, not as single, free living cells. Based on these early observations, he devised and conducted a series of elegant experiments and developed the concept of microbial ecology at surfaces. He showed how microorganisms can colonise surfaces and live as sophisticated communities of cells in what we now call biofilms. Of several firsts, the innovative work conducted while on sabbatical at Harvard University in 1969–70, which led to the precise physicochemical description of defined stages of bacterial adhesion to surfaces, remains a milestone contribution to microbial ecology and biofilm research. His ground-breaking *Interfaces in Microbial Ecology*, published in 1976, is a citation classic and a book that rewrote the science of microbial ecology. It was pivotal also to the establishment of today's scientific discipline of microbial biofilms, a foundation for our understanding of some of the most fundamental life processes.

Thanks to Kevin's exploration of microbial life at interfaces, we now appreciate that microorganisms colonise surfaces by elaborate mechanisms and development programs, which allow them to coordinate their phenomenal metabolic capacities and, in fact, ensure the wellbeing of our planet. Microorganisms use the biofilm mode of life to drive elemental and biogeochemical cycles, to remove toxic materials and to enable engineering practices to deliver clean water. These are the processes that we need to understand and harness to have a sustainable environment.

Author: Staffan Kjelleberg

University of NSW

More broadly, Kevin's scientific discipline has catered for very rapid developments and has emerged as a pillar not only in science, but also in industry and medicine, and biofilm research today is a massive international enterprise and driver of new technologies.

The introduction of new scientific concepts requires that they are delivered and communicated in a way that engages and convinces people. Kevin was a master at presenting. His many keynote addresses at international conferences were always elegant, visionary, exciting yet non-pretentious and entertaining; the hallmark of Kevin's easy-going, generous and totally disarming character. He captivated people by having the unique combination of brilliance in science and the gift of relating to and engaging people. Indeed, many of my colleagues have told me that Kevin was their greatest inspirational source as they embarked on a scientific career. Countless students were guided by Kevin's findings and teaching to enter scientific professions, several of whom have become today's leaders in the field.

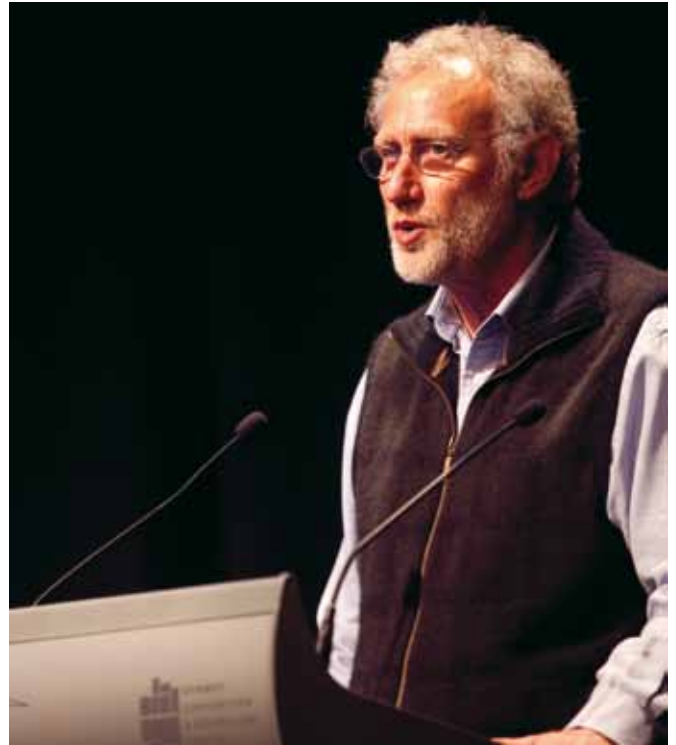
Kevin Charles Marshall was born on 25 January 1932 in Lithgow, NSW, and was a Bachelor of Science graduate, with Honours in Microbiology, of the University of Sydney in 1954. He then worked for the Department of Agriculture in NSW, before completing his PhD, in 1961, at Cornell University in the US. Upon his return to Australia, Kevin was a research scientist with CSIRO in Perth (1961–63), Senior Lecturer at the University of Tasmania (1963–74), and Professor of Microbiology at the UNSW (1974–92). He became Emeritus Professor at UNSW in 1992. As part of his many contributions to science and society, he was committee member, President (1981–82), founder of the Microbial Ecology interest group, Rubbo Orator and Honorary Life Member of the ASM.

Following his retirement, Kevin remained engaged in his scientific discipline and contributed greatly to the research conducted on microbial biofilms at UNSW. In recognition of his contributions and standing in the scientific community, Kevin gave the opening address at the world conference of the International Society of Microbial Ecology, the main scientific organisation of his discipline, in Cairns in 2008.

Kevin is survived by Rosemary, his wife of 52 years, and his three children Paul, Cathy and Chris.

ASM 2010 Sydney





Report of the ASM scientific meeting Sydney, 4–8 July 2010

The 2010 scientific meeting of the Australian Society of Microbiology took place in Darling Harbour, Sydney, during a wet and blustery week in early July. Although the meeting proper kicked off on the evening of Sunday 4 July, workshops were running throughout the weekend, starting on Saturday at 9 am and finishing at 5.30 pm on Sunday. Topics ranged from advanced microscopy and antibiotic resistance to clinical mycology and education, with a total of more than 240 attendees. Feedback from those participating was uniformly positive and the venue, which had been kindly provided by the Faculty of Science at the University of Technology Sydney (UTS) was excellent.

Also on Sunday we took advantage of our visiting scientists to mount a public forum aimed at presenting some of the topical issues in microbiology to the general public. Professor Ian Charles from UTS moderated the forum, with four panellists, Dr Malcolm McDonald, Professor Michael Gillings, Professor Alan Hampson and Professor Harald zur Hausen, speaking on topics that included Indigenous health, antibacterial hand washes, influenza and virus-induced cancers. Around 100 people attended this very entertaining and informative session.

Sunday night saw the meeting officially opened by ASM president Hatch Stokes. A terrific Bazeley Oration was given by Nobel Laureate, Professor Harald zur Hausen, who talked about some of his latest research on the involvement of infectious agents in human cancers. In keeping with our theme, *Bridging diverse cultures*, the opening ceremony was inspired by the Mediterranean, with Greek dancers and southern European food.

The scientific program ran from Monday 5 to Thursday 8 July. As is usual at AMS meetings, we had the good fortune to host

plenary talks from outstanding overseas and local scientists. We saw a great balance of fundamental and clinical microbiology, with research areas including antibiotic resistance, bacterial structure, physiology and virulence, mycology, virology, genomics and ecology. The Australasian Mycological Society ran their two-day meeting in conjunction with the ASM, with good attendance from members of both societies.

A particular highlight of the scientific program was the Rubbo oration, which this year was given by Professor Staffen Kjelleberg from the University of New South Wales, who spoke on his work on marine microbiology and the profound influence this has on our lives and wellbeing. This was followed by the Rubbo supper and dance, where we were all treated to a Mexican sombrero and a terrific Latin dance band. After so much solid science it was a great opportunity to unwind and have some fun with our ASM friends and colleagues.

The meeting concluded on Thursday 8 July, when the ASM flag was passed to Mark Tamplin, Chair of the ASM meeting to be held in Hobart next year.

On behalf of the ASM 2010 Local Organising Committee, we thank all those that were involved in making our meeting such a success, including our trade sponsors, the ICMS conference organising team, the venue operators, the ASM executive office and the ~940 delegates that attended. We look forward to seeing many of you again next year!

Dee Carter, Chair of the Local Organising Committee

Andy Holmes, Chair of the Scientific Organising Committee

Jocelyne d'Souza-Basseal, Social Program Coordinator

Ros Escott, Workshop Coordinator



2010 ASM Awards

2010 Frank Fenner Award

Associate Professor Elizabeth Hartland



Dr Hartland obtained her PhD in 1996 from the University of Melbourne funded by an Australian Postgraduate Award. In 1998, Dr Hartland was awarded a NHMRC/Royal Society Howard Florey Fellowship, which enabled her to spend two years in the Department of Biochemistry, Imperial College, London, where she began to study the virulence mechanisms of enteropathogenic and enterohaemorrhagic *E. coli*.

In April 2000, Dr Hartland joined the Department of Microbiology, Monash University where she established an independent research laboratory investigating the pathogenesis of infections caused by *E. coli* and *Legionella*. In 2007, Dr Hartland relocated to the Department of Microbiology and Immunology at the University of Melbourne. In 2009, she was awarded an Australian Research Council Future Fellowship and promoted to Associate Professor.

The overall aim of our research is to discover host processes subverted by bacteria during infection. In particular, we are studying the interaction of novel bacterial virulence proteins with eukaryotic cells to establish the biochemical and molecular basis of their role in pathogenesis. We have found that type III secretion system effector proteins injected into host cells by enteropathogenic *E. coli* (EPEC) interfere with innate immune signalling pathways and suppress host inflammatory responses. Since these factors are also shared by *Salmonella* and *Shigella*, this work has provided novel insight into the evolution of virulence traits among bacterial pathogens.

2010 Rubbo Orator

Professor Staffan Kjelleberg



Professor Kjelleberg is internationally recognised for his studies on bacterial adaptive responses, bacterial signalling and communication, bacterial biofilm biology, and chemically mediated interactions between bacteria and marine sessile organisms. His research approach includes molecular-based studies of the mechanisms by which bacteria respond to prevailing conditions, as well as environmental genomics of natural microbial consortia.

Kjelleberg has published more than 230 original papers in international refereed scientific journals and 30 books and book chapters. He has established a large portfolio of patents resulting from strong collaborative research across microbiology, biofilm biology, marine ecology and chemistry.

This intellectual property has been utilised by a number of biotechnology industries. His research leadership is reflected in his presidency and board membership of the International Society of Microbial Ecology. Kjelleberg and his colleagues at the Centre for Marine Bio-Innovation, of which he is Director, also serve as research providers to several companies and organisations nationally and internationally.



The Rubbo Oration honours Professor Sydney Rubbo's contribution to Australian Microbiology and is made possible with the continued support of the Rubbo Trust – University of Melbourne

2010 Honorary FASM Awards

Professor Staffan Kjelleberg



For a description of Professor Kjelleberg's contributions see under 2010 Rubbo Orator (above).

2010 Honorary FASM Awards

Nobel Laureate Professor Harald zur Hausen

Nobel Prize (Medicine 2008)

German Cancer Research Centre Heidelberg, Germany



Professor Harald zur Hausen studied Medicine at the Universities of Bonn, Hamburg and Düsseldorf and received his MD. He worked as postdoc at the Institute of Microbiology in Düsseldorf, then as Assistant Professor in the Virus Laboratories of the Children's Hospital in Philadelphia, senior scientist at the Institute of Virology of the University of Würzburg, and as Chairman and Professor of Virology at the University of Erlangen-Nürnberg. In 1977 he moved to a similar position to the University of Freiburg. From 1983 until 2003 he was appointed as Scientific Director of the Deutsches Krebsforschungszentrum (German Cancer Research Center) in Heidelberg. Professor zur Hausen has a special interest in infection-induced malignancies. He showed the role of papillomaviruses in cervical cancer and discovered a larger number of novel virus types.

He received numerous national and international awards, including the Robert-Koch-Prize, the Charles S Mott Prize of the General Motors Cancer Research Foundation, and the Federation of the European Cancer Societies Clinical Research

Award, the William B Coley Award for Distinguished Research in Basic Immunology of the Cancer Research Institute, the Prince Mahidol-Award, and the Warren Alpert-Prize of the Harvard University.

Harald zur Hausen holds seven Honorary Degrees. He is an elected member of various academies, such as LEOPOLDINA, Academia Europaea, Heidelberg Academy of Sciences, Polish Academy of Sciences, Institute of Medicine of the National Academy of Sciences (USA), and of research organisations including EMBO and HUGO.

He has memberships in Editorial Boards of several journals and is currently the Editor-in-Chief of the *International Journal of Cancer*. In October 2008, he was awarded the Nobel Prize for Medicine.

David White Excellence in Teaching Award

Elwyn Oldfield



I have enjoyed teaching microbiology for over 30 years at the University of Queensland. My teaching has been mostly in practical classes, where I have coordinated and tutored classes for medical, dental, science, physiotherapy, human movement and chemical engineering students, and I have also conducted lectures in medical, science, physiotherapy, human movement and nursing courses.

In a broader capacity, I have been a PBL facilitator for the first 12 years of the graduate medical course at UQ, and currently am one of the coordinators of the PASS program (Peer Assisted Study Sessions), which is greatly appreciated by the students in the high enrolment first year science courses at UQ.

An ASM initiative at the Annual Conference in Canberra in 2005 was the introduction of a microbiology workshop for high school science teachers.

In 2006 I redesigned the workshop and along with Cheryl Power (ASM Ed SIG Chair) conducted it at the Conference on the Gold Coast. The enthusiasm of the teachers, and the support from the Science Teachers' Association of Queensland, have inspired me to continue to run the workshop annually at UQ since 2006. We have plans for the future to develop it into a more comprehensive resource for high school science teachers, particularly in remote areas.

My career as a university teacher has been very rewarding, and I applaud the ASM for making such awards available, as it gives recognition to teaching as a valuable university function. I also hope that the opportunity to talk about the teachers' workshop might inspire all of us to reach out to schools, to inspire high school students to go on and study microbiology at the university level, to provide the researchers necessary in the pursuit of solutions to many of the world's problems.

2010 FASM Awardees



*Adjunct Associate
Professor Silvano Palladino*



Professor Richard Whittington



Dr Ian Mackay

ASM 2010 Teachers Travel Award

Karena L Waller



Improved student engagement is often referred to in the educational literature as a highly desirable outcome of improved teaching and learning strategies being implemented within a course. At the university level, microbiology is most commonly taught in 'theory-heavy' traditional lectures, perhaps in conjunction with an accompanying laboratory-based practical class.

Although commonly used around the world, the traditional lecture has particular limitations in providing the most effective environment for the teaching and learning of students and, as a result, student engagement can be negatively impacted. I am particularly interested in improving or developing novel strategies that can be applied in the teaching of university-level microbiology that result in improved student engagement. As part of this interest, I am currently investigating the utility of assessed online quizzes as a means of enhancing student engagement in a second year level microbiology lecture-only course.

2010 BD ASM Student Award Winners



Ivor Russel Lee
QLD



Stephanie Bell
WA



Michael Liu
NSW/ACT



Esta Hages
TAS

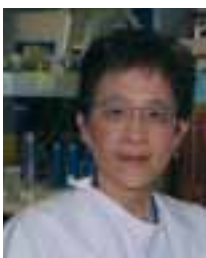


Jaclyn Suzanne Pearson
VIC



Bart Eijkelkamp
SA

2010 Merck Sharpe & Dohme ASM Mycology Award



Ms. Joanna Cheng is a Senior Hospital Scientist in the Department of Microbiology, SEALS at Sydney Prince of Wales Hospital. She has been involved in clinical mycology for over 20 years.

Over this time, she has made great contribution in setting up the mycology laboratory in SEALS, improved the techniques in isolation and identification of fungi. She has trained many scientists and registrars in the field of clinical mycology.

In 1993, she was awarded the Pfizer Mycology Encouragement award for presentation of a case study of *Scedosporium mycetoma*.

In 2000, she obtained a Master of Science degree, her thesis centring on developing a new disc diffusion test for antifungal susceptibility testing of yeasts. The results showed good correlation with the CLSI method. The new disc diffusion antifungal test provided a simple and cost-effective alternative method to perform antifungal susceptibility on yeasts.

More recently, the laboratory is moving towards molecular diagnosis in order to provide faster results to the clinicians. Joanna has developed the nucleic acid sequencing of difficult fungi and yeasts using the 18s RNA ITS3 and ITS4 region and is in the process of developing an assay which can detect and identify fungi from microscopy positive clinical samples, such as fresh tissue and fluid.

2010 Merck Sharpe & Dohme ASM Mycology Award



Dee Carter: Sex and Drugs in Pathogenic Fungi

Dee Carter's research focuses on medically important fungi, particularly the yeast pathogens *Cryptococcus neoformans* and *Cryptococcus gattii*. Although infection is usually benign, it can progress to life-threatening meningitis, which can be fatal if not treated. Infection begins when a suitable propagule, most likely a sexual spore, is inhaled from the environment. Unfortunately, treatment options are very limited as there are few antifungals available, the efficacious are also toxic to humans and resistance is a growing problem.

Dee's work centres on understanding three aspects of cryptococcosis. Firstly, population genetic approaches are used to understand how the yeast spreads in the environment and may be subsequently acquired by a susceptible host. Secondly, how the disease initiates and progresses in the human host is studied using proteomic approaches to identify yeast proteins that are up and down regulated during infection. And thirdly, proteome and biospectroscopic methods are employed to understand how *Cryptococcus* can become resistant to antifungals.

2010 OXOID ASM Culture Media Award



John Merlino

Dr John Merlino is a Senior Scientist in the Department of Microbiology and Infectious Diseases Concord Hospital – SSWAHS and a Clinical Associate lecturer and researcher in the Department of Infectious Diseases and Immunology, Faculty of Medicine of the University of Sydney. For the last 25 years, John's research interest and focus has been bacterial identification, antimicrobial resistance and the examination of new synthetic chromogenic substrates in culture media and their applications to the diagnostic microbiology laboratory. New enzyme-based chromogenic substrate investigations were extensively investigated in his research topics both for his MSc (Honours) at Macquarie University on the detection of vancomycin-resistant enterococci (VRE) and PhD (Medicine) at the University of Sydney on the detection of multidrug and non-multidrug-resistant MRSA.

His focus has been on:

- Improved accuracy of micro-organisms detection.
- Faster detection of targeted micro-organisms and resistance mechanisms.
- Cost-effective methodologies.
- Ability to easily integrate enzyme-based chromogenic culture media with other antigen and/or nucleic acid technology.

Overall, Dr Merlino has collaborated with many overseas and local senior scientists and published many articles. He has been invited to give presentations and organise workshops with other colleagues on chromogenic culture media and their integration and applications in diagnostic and research microbiology at many scientific meetings both nationally and internationally.

2010 Pfizer ASM Mycology Encouragement Award Winner



Ian Arthur

Ian is the Senior Scientist of the mycology laboratory at PathWest, QEII Medical Centre, where he has worked since 1992 with experience in all aspects of clinical mycology. He oversees the daily running of the laboratory and also gives several university lectures. The laboratory has had a long interest in superficial mycology, which now uses classical and molecular identification techniques to identify the full range of fungal pathogens.

He has had opportunities to present abstracts at both national and international conferences on areas as diverse as serology, *Nocardia* identification, fungal isolation media, Sporotrichosis and Scedosporiosis. He has been an ASM member since 1992 and has sat on WA branch committee since 2006 and convened the mycology workshop at the 2009 ASM annual meeting.

ASM 2011

4 – 8 July 2011

Hotel Grand Chancellor, Hobart, Tasmania

ASM2011: *Microbiology on the Edge*

Q & A for Glen Ulett, FASM



Could you tell us a little about your career in microbiology?

I finished my PhD in Microbiology at James Cook University (JCU) in 2001 on the pathogenesis of the bacterial disease, melioidosis. I immediately undertook postdoc work from 2001 to 2005 at St Jude Children's Hospital in Memphis, Tennessee in the USA, where I worked on streptococcal disease pathogenesis. I then returned to Australia to do more postdoc work at the University of Queensland (UQ) continuing on bacterial pathogenesis under the guidance of Associate Professor Mark Schembri. In 2009, after frequent time spent at the University of Alabama performing joint projects, I took a position as Senior Lecturer at the Centre for Medicine and Oral Health at Griffith University.

How long is it since you completed your studies and what is your role where you are now?

I think I've yet to complete my studies! It's a continual undertaking in the sense of learning something each month and applying that to our research work. In terms of my current role, half my time is devoted to teaching undergraduate microbiology via lectures and courses and the rest is spent developing a small research group; the latter involves supervising a couple of PhD students, writing research papers and grants and trying to get into the lab to perform actual experiments with a postdoc who has recently joined my group.

What do you see as the biggest challenges for microbiology today?

Microbiology is pervasive in everything we do in society and yet it's still seen as dull in some circles of science. In reality, the exact opposite is true: it's an exciting, vibrant and challenging branch of science to be involved with. I think the way to enhance the impact of microbiology as a science is to show its relevance to society and how it improves your and my wellbeing and lifestyle. The challenge is how to do this. Education at high school and tertiary levels, even in primary school is probably the best way and there are some really passionate teachers around Queensland who are starting to do this proactively. But microbiology education brings its own inherent challenges, like how to make it fun, appealing, and stimulating; these types of challenges need addressing to ensure students get and stay interested in microbiology as a science.

Why did you decide to apply for a FASM?

During my years as a student and then postdoc, attending ASM conferences regularly, I noticed that most senior microbiologists in Australia were Fellows of ASM. When I looked into it a few years ago I realised that the process of becoming FASM was pretty straightforward and it was a useful accreditation for professional recognition, career development and promotion, so I went for it.

How did you find the whole process from initial enquiry to the final decision?

Easy, straightforward; something most people would find painless.

How do you see the FASM helping your career progression?

I think the FASM enabled my current employer to make an immediate connection between this type of professional recognition and career experience and achievements in microbiology. I do believe it has been beneficial for my promotions.

Did you have an exemption from Part 1 or Parts 1 and 2?

I was exempt from Parts 1 and 2.

What was the format of your Part 3 dissertation?

I had published a collection of research papers on cell death in streptococcal infection, and then subsequently wrote a review on apoptosis in response to bacteria for *Current Immunology Reviews*. A combination of the research papers and the review formed a small dissertation that I bound in hard-copy form and submitted to ASM.

How long did it take you to prepare your Part 3 dissertation and what aspects made this easy or difficult?

Because the work had already been published, it took probably only one day to collate it all together, write an introduction and summary and have it bound. It really wasn't difficult at all.

Has your award of a FASM been recognised by your employer in some way?

Yes, it has been used in the promotions process and has been recognised as a positive aspect for career progression in my school.

Would you recommend FASM to other microbiologists?

The process was easy, quick and not at all onerous for anyone with a few research papers and a review in their particular area. Recognition as FASM denotes someone's achievements in microbiology in Australia and especially for early-mid career stage people this may help career development; so yes, I'd recommend it.

Jeff Butler – Burnet-Hayes award



Jeff Butler

CSIRO-Australian Animal Health
Laboratory
5 Portarlinton Road
East Geelong VIC 3219

Jeff with the President of the SGM, Prof Hilary Lappin-Scott.

Late last year I was thrilled to receive the Burnet-Hayes award for 2010. With the same excitement I travelled to the UK in March this year to visit three world-renowned research institutes, all located within one hour of London. I also made a presentation of my PhD research at the spring meeting of the Society for General Microbiology (SGM) held in Edinburgh.

My first activity was to visit the Institute for Animal Health (IAH) at Pirbright, a centre of excellence for research into infectious diseases of farm animals. The IAH is currently part way through a major capital improvement program with a new secure laboratory complex set to open in the next few months. In addition, construction has recently begun on a large, state-of-the-art, high-biosecurity facility which is set to open in 2013. My visit there consisted of a visit to the secure area and tours of the old and new laboratory facilities, as well as meeting with several senior staff to discuss potential collaborative projects.

Next I visited the National Institute for Medical Research (NIMR) at Mill Hill, which houses the UK WHO Collaborating Centre for Influenza. The NIMR focuses largely on influenza in humans and is famous within the influenza research community for being the first laboratory to isolate a human influenza virus in 1933. Today the institute is probably more famous for its imposing art deco-style building, which served as the Gotham city asylum in the 2005 movie *Batman Begins*. At the NIMR I conducted a seminar of my PhD research and afterwards held lengthy discussions with senior researchers about the different ways to tackle some of my future research questions. Some of the insight I received during these discussions has significantly influenced the remaining experiments I need to complete for my thesis.

Following these lab visits I attended the SGM spring meeting in Edinburgh. The SGM meeting consisted of a four-day program, which included up to seven concurrent sessions, a variety of keynote lectures, workshops for early career microbiologists and public engagement events. In particular, I found the pre-

conference event for early career microbiologists to be an excellent activity, which brought together all the students and taught us effective communication strategies to make the most of the networking opportunities available at the conference. Equally as important, it allowed all the students to get to know one another, which instantly gave us a network of colleagues to interact with for the rest of the meeting. The SGM meeting also provided me with my first opportunity to present to a relatively large audience of several hundred people, an experience I found quite exciting. Following my presentation, I received a lot of supportive comments and positive feedback.

Finally, towards the end of my trip, I visited the Veterinary Laboratories Agency (VLA) at Weybridge, which serves as a reference laboratory on avian influenza to a range of authorities including the World Organisation for Animal Health, The UN Food and Agricultural Organisation, the UK government and the European Union. The VLA is famous internationally for its research on influenza in swine and avian species and also serves as a leading supplier of influenza diagnostic reagents. At the VLA I met with a broad range of influenza researchers who work on many aspects of influenza, including virology, immunology, diagnosis, epidemiology and so on. I also toured their bio-secure animal research facilities and conducted a seminar of my PhD research.

The end of my trip was quite eventful and I almost didn't make it to my final lab visit at the VLA. The night before I was due to arrive I was stranded in the Netherlands by the shutdown of European airports following the volcanic eruption in Iceland. The line for tickets at the railway station was over two hours long and when I got to the head of the queue I learned that I would have to wait three days for a train to the UK. After contacting the VLA to warn them I may not be able to make it, I decided to try the bus station and through a combination of persistent haggling and a lucky few seat cancellations, I managed to get onto an overnight bus, which got me to London sometime after 5 am. The people at VLA thought it was something of a miracle when I arrived the next morning not having slept and looking a little dishevelled. But with a little coffee I somehow managed to put on what was probably my best seminar yet!

I thoroughly enjoyed the experience of visiting the three research institutes and appreciated the opportunity to present my research at the SGM meeting in Edinburgh. The Burnet-Hayes award has given me an invaluable introduction to each of the laboratories I visited and has made me profoundly optimistic about future collaborations with these institutes. In addition, the SGM meeting has left me with a greater appreciation of the wide range of interrelated research activities conducted under the umbrella of microbiological research. I am sincerely grateful to the ASM for providing me with the Burnet-Hayes award.

Jackie Mahar – Millis-Colwell award



Jackie Mahar

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Immunity and Environment
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The Millis-Colwell award provided funding for my trip to San Diego to attend the American Society for Microbiology AGM in May of this year. The award also covered the cost of registration for the meeting. I presented my abstract *Genetic Characterisation of the Capsid Gene of Norovirus Genotype GII.3 Strains Identified in Children Admitted to Hospital with Acute Gastroenteritis*, which outlined preliminary studies into the evolution of one of the most common norovirus strains infecting children. Presenting at such a large meeting provided valuable experience as well as exposure to many of the leading experts in the field. I also had the pleasure of meeting a number of influential microbiologists. As well as the opportunity to present my work, I was also able to gain a lot from the meeting in hearing about the latest research in a variety of different microbiological fields, alongside virology.

In addition to the opportunity to attend the ASM AGM, the Millis-Colwell award provided funds for an eight-week visit to the norovirus gastroenteritis unit in the Laboratory of Infectious Disease at the National Institute of Allergy and Infectious Disease (LID-NIAID), NIH, in Bethesda, MD. The lab is headed by Dr K Green, a world leader in understanding norovirus disease pathogenesis.

The overall aim of the NIH visit was to learn the method of VLP production using norovirus capsid. To assist this process, I was able to take GII.3 norovirus isolates, which were collected from Australian children during 2006–2008 to this lab, to produce new VLPs. The method of making VLPs can be extremely difficult and can take months to optimise and learn unaided. Learning the process in this lab allowed me to produce these



Jackie is presented with a certificate of her award by Prof Keith Klugman, Chair of the International Board of the ASM.

VLPs in a significantly shorter time frame using optimised methods, whilst gaining valuable experience and insight in this area. Over the eight-week period, I was able to learn the entire multistep method for making VLPs and I produced VLPs using my Australian samples as well as a number of other archival samples provided by the NIH. All of the VLPs produced will be highly useful in my future research and will be the source of future collaboration between the NIH and our lab at the Murdoch Children's Research Institute (MCRI).

The VLPs produced during my NIH visit are vital to our studies to explore homotypic and heterotypic immunological regions on the GII.3 norovirus genotype. The constructed norovirus GII.3 VLPs, produced by expressing the norovirus capsid gene in a baculovirus expression system, will be the immunogen used to produce both monoclonal and polyclonal antibodies. Both VLPs and the antibody will be used to map norovirus GII.3 capsid epitopes. The production of new VLPs derived from the recent GII.3 strains will provide an important and unique comparison of evolution in immunologically important regions over the past four decades. My earlier studies on the prevalence of norovirus in hospitalised children in Melbourne with acute gastroenteritis from 2006 to 2008, have established genotype GII.3 as an important cause of disease in children.

My visit served to strengthen the existing collaboration between my lab at the MCRI and the norovirus gastroenteritis unit at the NIH and the reagents produced during my visit will also be useful in their ongoing norovirus studies. Our two labs will enjoy continued, long-term collaboration and, in particular, we look forward to collaborating on projects involving these VLPs.

Visiting this specific lab was invaluable as I was able to work with people who are experts in the field of norovirus research. I am very grateful to have had the opportunity to meet and learn from some of the most influential researchers in my field.

Overall, my visit to the United States of America was highly beneficial toward the completion of my PhD project, in addition to supporting the development of important long-term collaboration and vastly broadening my knowledge base.