



## From the editor

By Tim Newsome

Dear Microbiologists,

Welcome to your latest issue of Syntrophy.

Some great seminars are on the horizon for ASM members. On Friday May 31 there is full day's conference on the worldwide problem of measles: 'What is going on with measles?'. This event will be held at Westmead and includes fantastic line up of speakers. Of all the problematic viral diseases that are in news recently, such as ebolavirus in the DRC and the surge in influenza virus deaths this year in Australia, the measles crisis seems to be most avoidable. So, what is going on? Come along and find out.

We are also very pleased to present Bob Hancock, who has agreed to deliver a seminar on July 18 at the University of New South Wales on antibiotic resistance. He is a giant in the field of multidrug resistant infections and if you have an interest in biofilms, you will definitely want to come along.

This month's Focus article is from one the Nancy Millis Award finalists, Will Klare, who was one of the highlights of the evening. His article presents the challenges and hopes for the development of a vaccine to *Pseudomonas aeruginosa*, which is associated with infections of the lung in Cystic Fibrosis patients. New technologies are shaping key advances in this field.

Also, don't forget to register for our National conference, ASM2019 in Adelaide.

Best wishes,

Tim.

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Syntrophy is distributed via email to ASM members located in NSW and the ACT using details included on the ASM National Office Database.

Not yet a member? Join today!

[www.theasm.org.au/membership](http://www.theasm.org.au/membership)

Submissions and enquiries can be directed to the Syntrophy Coordinator via the ASM NSW-ACT Branch Secretary.

Organisations with research opportunities, or companies seeking to fill positions are welcome to place an advertisement in an upcoming issue of Syntrophy. Please contact the Syntrophy Coordinator with your details for inclusion.



## Focus Article

# A viable vaccine against the versatile pathogen *Pseudomonas aeruginosa*: are we there yet?

By William Klare<sup>1,2</sup>, James A. Triccas<sup>2,3</sup> and Stuart J. Cordwell<sup>1,2,4</sup>

<sup>1</sup> School of Life and Environmental Sciences, <sup>2</sup> Charles Perkins Centre, <sup>3</sup> Discipline of Infectious Diseases and Immunology, <sup>4</sup> Discipline of Pathology, School of Medical Sciences, University of Sydney, Australia 2006.

*Pseudomonas aeruginosa* is a bacterial pathogen characterized by a large and diverse genome that facilitates wide niche adaptability and therefore confers an ability to infect a broad range of hosts. In humans, *P. aeruginosa* causes disease by infection of epithelial cells and mucosa. It is primarily associated with infections of burn and surgical wounds, implantable medical devices, and lung infections in individuals with a compromised immune system or Cystic Fibrosis (CF).

Most infections are difficult to eradicate, since they are complicated by the formation of biofilms (1). Nearly all components of the structural matrix interact in some manner to strengthen biofilm cohesion, and either sterically limit access, or directly reduce the effect of traditional antibiotic therapy to the bacterial community residing within (2). This issue is further compounded by the rapid rise of antimicrobial resistance (3), with *P. aeruginosa* in the World Health Organisation Priority 1 (critical) group for development of new eradication therapies. In the case of CF, difficult to eradicate bacterial populations become longitudinal infections; with *P. aeruginosa* the primary cause of morbidity and mortality in CF, resulting in an average lifespan of around 40 years of age.

The most viable alternative to antibiotic therapy, in general, is prevention, typically via utilisation of vaccines. *P. aeruginosa* is a heavily studied pathogen with Pubmed listing >64,000 publications. Why then, after 30 years of intensive research, are there no efficacious anti-*P. aeruginosa* vaccines?

To date, there have been several attempts at creating vaccines against *P. aeruginosa*. Efforts have focused on cell surface-exposed parts of the *P. aeruginosa* cell – including flagellins (4), outer membrane proteins (5), lipopolysaccharide (LPS) (6), pilins (7) and exoproteases (8). Whilst many of these have made it to clinical trials and generated robust humoral immunity, none have been adopted as global vaccines. A major reason for the lack of a globally effective vaccine is the highly heterogeneous nature of many antigens amongst clinical isolates, particularly those of the CF lineage (9).

Where conventional approaches fail to generate efficacious outcomes, then alternative strategies must be considered. In the era of big data, it is crucial that microbiology as a discipline seeks to utilise the integration of -omics technologies with bioinformatics to facilitate the generation of new hypotheses that are directed by cross-complimentary multivariate data to tackle issues that are also highly complex in nature. Surveys of *P. aeruginosa* niche adaptation typically focus on individual -omics to draw biological insight from targeting individual

physiological networks including metabolomes (10), proteomes (11) and genomes (12).

Integrating these global analyses enables conclusions to be drawn regarding the physiology of the organism during infection, or in comparisons between clinical, environmental and / or laboratory strains. Insights can then be derived from an entire-network understanding and drawing upon such information facilitates highly targeted hypotheses to be formulated regarding potential vaccine candidates. Moreover, there is an extensive suite of computational prediction software freely available to predict the potential features of protein vaccine candidates, such as antigenicity (13) and B cell epitopes (14) present within the amino acid sequences of these proteins. Our lab has recently focused on capitalising on multi-omic datasets of *P. aeruginosa* strains and isolates, facilitating several animal trials of whole-protein antigens with promising results. It is our hope that this new era of intersection between -omics technologies and microbiology can bring about significant progress in anti-*P. aeruginosa* therapeutics.

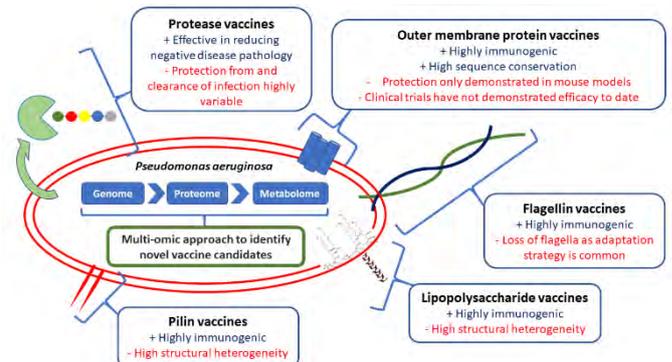


Figure 1. Advantages and limitations of structural components of *Pseudomonas aeruginosa* used as vaccines to date. Boxed in green is a multi-omic strategy for generation of novel efficacious vaccines

## References

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## About the Lead Author

William Klare is a PhD student in the Microbial Pathogenesis and Vaccinology Group lead by Professor Stuart Cordwell. He received his Honours in Infectious diseases studying novel anti-biofilm therapeutics against *Pseudomonas aeruginosa*, a major pathogen in individuals suffering from Cystic Fibrosis. Will has previously worked in a variety of fields, including developing microbial bioindicators for groundwater risk assessments, and investigating the effects of drugs of addiction to neuroepigenetic machinery in honeybees. His current research involves the use of large-scale 'omics approaches to better understand mechanisms used by *P. aeruginosa* to colonize the CF lung and to subsequently identify candidate protein and peptide-based vaccines for interventions in CF patients.

## Key dates

### ASM NSW-ACT Branch CS&MSIG in conjunction with CIDM and NSW Health Pathology Measles Symposium

31 May 2019, see details page 5

### ASM 2019

30 June - 3 July 2019, see details page 6

### ASM NSW Seminar - Alternatives to Antibiotics for Multidrug Resistant Infections and Inflammation

18 July 2019, see details below

### NSW Health Pathology Concord Hospital Diagnostic Mycology Workshop

27 – 28 August 2019, see details page 8

### ASM BacPath 15

30 September – 3 October 2019, see details page 1



## ASM NSW Seminar

### Alternatives to Antibiotics for Multidrug Resistant Infections and Inflammation

R.E.W. (Bob) Hancock, Dept. Microbiology and Immunology, UBC, Vancouver, Canada

### Thursday 18<sup>th</sup> July

To be held at School of Optometry and Vision Science, UNSW  
Rupert Myers Building, Barker St, Kensington NSW 2033

Contacts: Professor Mark Willcox  
UNSW School of Optometry & Vision Science. Tel: 0409 658313

and Dr Alan Heritage,  
ASM NSW Branch Committee, Tel: 0418 459496.

Professor Bob Hancock is Professor, Department of Microbiology and Immunology, University of British Columbia, and Director, Centre for Microbial Diseases and Immunity Research. Professor Hancock, originally from Perth, has worked at the University of British Columbia for over 30 years. He has received many awards for his research including the Prix Galien (Highest Award for Canadian Pharmaceutical Research and Innovation) in 2012, Doctor of Science, honoris causa, University of Guelph in 2008 and McLaughlin Medal, Royal Society of Canada (For important research of sustained excellence in medical science) in 2005. His research centres around designing new therapeutic strategies to treat infections in the light of increasing antibiotic resistance coupled with a dearth of new antibiotic discovery. His research interests include cationic host defence (antimicrobial) peptides as novel antimicrobials, anti-biofilm agents and modulators of innate immunity, the development of alternatives to antibiotics for resistant infections, the systems biology of

innate immunity, inflammatory diseases and *Pseudomonas aeruginosa*, and antibiotic resistance, particularly multidrug adaptive resistance. He has published more than 670 papers and reviews, is an ISI highly cited author in Microbiology with more than 63,000 citations and an h-index of 134 and has 55 patents awarded. He is the co-founder of Migenix, Inimex Pharmaceuticals, ABT Innovations, Sepset and the Centre for Drug Research and Development.

He will present aspects of his research in a seminar entitled "Alternatives to Antibiotics for Multidrug Resistant Infections and Inflammation" at the University of New South Wales on Thursday 18th of July - this is a seminar you will not want to miss if you are interested in antimicrobial resistance, development of new antibiotics, biofilms and *Pseudomonas*.

The inexorable increase in multidrug resistant infections combined with a decrease in new antibiotic discovery and the lack of compounds to treat recalcitrant infections, such as those associated with sepsis and chronic infections, is creating a potential crisis in human medicine.

Thus, it is imperative to consider alternatives to conventional antibiotics for treating infections.

Professor Bob Hancock will discuss four examples, namely: (1) an approach to address immune dysfunction in sepsis based on a predictive diagnostic gene expression signature of cellular reprogramming; (2) immunomodulatory peptides based on a template of natural cationic host defence (antimicrobial) peptides, which protect against infections and inflammation, (3) a new strategy for identifying host-directed therapies based on the use of mutated stem cells and (4) a class of broad-spectrum peptides that acts against chronic and biofilm infections.



The Cosmetics and Pharmaceuticals Special Interest Group (CAPSIG)  
ABN 20 932 313 797



## Challenges in the Pharmaceutical Industry - Seminar 17 April 2019

By Heather Manning, CAPSIG Committee

The main focus was on the employment situation, requirements and expectations for the future of people working within the Pharmaceutical industries.

In recent times we have seen the ongoing exodus of pharmaceutical companies relocating manufacturing facilities and other business units to offshore locations. Business acquisitions and mergers within Australia also pose threats and uncertainty to the number of positions available within our industry.

What is driving this change – is it market demands, cost of local manufacture, outsourcing to contract manufacturers or unskilled personnel?

How will our industry sustain these changes and what emerging trends do we need to be aware of to ensure that our knowledge and skillset will guarantee longevity within the industry.

The seminar aimed to provide an insight into some of the challenges currently faced within the industry- our speakers informed us of how to be "work ready" what opportunities are out there and what future employers are looking for in their candidates.

It also touched on the importance of training and how important it, plus team players are to future employers / companies.

Our first speaker was Jacqueline Berry from Seer Pharma whose role is as a consultant and lecturer, her talk emphasised the importance of training and education as a key factor for the job market.

The next speaker was Peter Salib Team leader from Techstaff – Peter discussed what process is involved in selecting a suitable candidate for a position.

He gave examples of how the best fit in one area may not be the best fit for the company's profile – expectations and a happy work environment.

Our final seminar presentation was a very informative talk involving Veterinary formulation, its challenges and changes.

The speaker was Chhaya Mahashabde, head of formulations from Virbac. Chhaya highlighted how teamwork and the right staff attitudes can bring about success in challenging situations and make changes. In particular, she discussed the work her team is doing to develop specific formulations within the veterinary field: a good example of teamwork meeting market requirements.

On the night we had a good attendance from graduate students and company participation.

Once again, a nice buffet was served, and networking was very active.

We would also like to thank our sponsors and the catering staff of Canterbury-Hurlstone Park RSL for their excellent service and assistance; ensuring a smooth running of the event.



## Symposium: What is going on with Measles?

Friday, 31 May 2019, 12.00 - 5.00pm  
Lecture Theatre 1, Westmead Education & Conference Centre  
Westmead Hospital, Westmead, Sydney

The NSW-ACT Branch of the Australian Society for Microbiology (ASM), Clinical Serology and Molecular Special Interest Group in conjunction with Centre for Infectious Diseases and Microbiology Laboratory Services ICPMR NSW Health Pathology (CIDMLS - ICPMR NSWHP) and the Centre for Infectious Diseases and Microbiology - Public Health WSLHD (CIDMPH) are pleased to present the 'What is going on with measles?' Symposium.

Measles is one of the world's most contagious diseases, with the potential to be extremely severe. In 2017, measles caused close to 110,000 deaths. WHO report that measles cases are up 300% in the first 3 months of 2019 compared with the same period in 2018. Measles cases have reached their highest level in Europe for 20 years, it is the cause of a health emergency being declared in New York City this year, and New Zealand reported on 7th May the highest number of measles cases in the country (42 confirmed in Auckland with a further 40 in quarantine). Australia has also had outbreaks in NSW and the Northern Territory. So, what is going on with this disease?

Come along to the measles symposium on 31st May 2019 at Westmead Education and Conference Centre (WECC) and hear the latest from clinicians, epidemiologists and public health physicians, vaccine specialists and laboratory scientists.

### Program includes:

Measles: Public Health Perspectives  
Dr Vicky Sheppard, Communicable Disease Branch, NSW Health

Measles vaccination: what should we know?  
Dr Kristine Macartney, National Centre for Immunisation Research and Surveillance, NCIRS

Waning immunity in relation to measles re-infection cases  
Ms Suellen Nicholson, Infectious Diseases Serology, VIDRL, Victoria

Clinical management of measles  
Dr Philip Britton, SCHN, The Children's Hospital at Westmead, NSW

Serology in diagnosis and surveillance  
Dr Linda Hueston, CIDMLS, ICPMR, NSW Health Pathology

Molecular diagnostics, genotyping/phylogenetics for case tracing  
Mr Ian Carter, CIDMLS, ICPMR, NSW Health Pathology

Proficiency testing - WHO measles IgM  
Ms Suellen Nicholson, Infectious Diseases Serology, VIDRL, Victoria

Proficiency testing - Measles testing are labs getting it right?  
Ms Deane Byers, RCPAQAP, Molecular Infectious Diseases, NSW

### Registration:

<https://measlessymposiumwestmead.eventbrite.com.au>

### Cost:

\$50.00 (includes light lunch and afternoon tea)

### Enquiries:

[linda.hueston@health.nsw.gov.au](mailto:linda.hueston@health.nsw.gov.au)

[www.asmmeeting.theasm.org.au](http://www.asmmeeting.theasm.org.au)

30 June -  
3 July  
Adelaide Convention  
Centre  
[www.theasm.org.au](http://www.theasm.org.au)

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The Australian Society  
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**KEY DATES**

**EARLY BIRD DEADLINE:**  
19 April 2019

**ORAL ABSTRACT DEADLINE:**  
19 April 2019

**POSTER ABSTRACT DEADLINE:**  
17 MAY 2019



# Confirmed Plenary Speakers



**Bazeley Orator, Prof. Luigina Romani** is internationally recognized in the area of antifungal immunity — a field in which her major interest is on the comprehension of mechanisms of antifungal immunity that lead to the activation of protective and non-protective adaptive immunity.



**Snowdon Orator, Dr. Marnie L. Peterson** is an expert in antibiotic resistance, antimicrobial stewardship, experimental therapeutics, and microbial pathogenesis with over 20 years of experience in the development of new therapeutics for infectious diseases



**Dr. Alan Landay** is Professor in the Departments of Internal Medicine and Microbial Pathogens and Immunity and is Assistant Provost for Team Science at Rush University Medical Center in Chicago. He has been involved in HIV research for over 35 years having performed some of the first immune evaluations of HIV infected haemophiliacs in 1982 while completing a postdoctoral fellowship at the University of Alabama, Birmingham.



**Dr. Karen Carroll** is a Professor of Pathology at the Johns Hopkins University School of Medicine. She attended the University of Maryland School of Medicine and stayed on to do an internship in Primary Care Internal Medicine. She spent the next three years in Rochester, NY in the Internal Medicine Program at the Associated Hospitals Program, University of Rochester School of Medicine, where she was also Chief resident of her program.



**Prof. Noah Fierer** is a Professor in the Department of Ecology and Evolutionary Biology and a Fellow of the Cooperative Institute for Research in Environmental Sciences at the University of Colorado at Boulder. He is a microbial ecologist and his research program focuses on microbes living in a range of environments.



**Prof. Sarah Gurr** studied at Imperial College of Science, Technology and Medicine (BSc, ARCS, DIC and PhD), where she was awarded The Huxley Medal for her outstanding record of achievement. She was a post-doctoral Fellow in Fungal Biology at St Andrews University and then held an independent Royal Society University Research Fellowship in Molecular Plant Pathology.



**Rubbo Orator, A/Prof. Tilman Ruff** is Co-President of International Physicians for the Prevention of Nuclear War (Nobel Peace Prize 1985); and co-founder and founding international and Australian chair of the International Campaign to Abolish Nuclear Weapons (ICAN), awarded the Nobel Peace Prize in 2017 "for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its ground-breaking efforts to achieve a treaty-based prohibition of such weapons".



**Prof. Miguel Viveiros** is Full Professor with Habilitation in Biomedical Sciences (Speciality Microbiology) in the Unit of Medical Microbiology (Group of Mycobacteriology) of the Instituto de Higiene e Medicina Tropical da Universidade Nova de Lisboa.



# NSW HEALTH PATHOLOGY

## CONCORD HOSPITAL DIAGNOSTIC MYCOLOGY WORKSHOP

**27<sup>TH</sup> – 28<sup>TH</sup> AUGUST 2019**

This workshop will consist of 2 days of medical mycology lectures and practical hands-on laboratory sessions that reflect current clinical and laboratory practice for the diagnosis and identification of invasive fungal infections.

Cost: \$450 (gst incl)

Places are strictly limited.

Please email booking form to  
[Bronwyn.Bailey@health.nsw.gov.au](mailto:Bronwyn.Bailey@health.nsw.gov.au)

For any further information

Evanthia Tambosis ([Evanthia.Tambosis@health.nsw.gov.au](mailto:Evanthia.Tambosis@health.nsw.gov.au)) or

Charlotte Webster ([Charlotte.Webster@health.nsw.gov.au](mailto:Charlotte.Webster@health.nsw.gov.au)) or

by phone on 02 97676904

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**CONFIRMATION OF BOOKING WILL BE SENT ONCE PAYMENT HAS BEEN RECEIVED.**