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The Australian Society for Parasitology Inc.

NEWSLETTER

Volume 35 Issue No.2 October 2024

IMAGE *Conference delegates enjoyed a wonderful Māori Cultural Performance at the Welcome Reception of the Parasites in the Pacific Conference, University of Auckland, New Zealand (image copyright Lisa Jones, ASP, 2024)*

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The Australian Society for Parasitology Inc.

NEWSLETTER

Volume 35 Issue No.2 October 2024

IN THIS ISSUE

From the President's Desk

Dear Members,

As another busy year draws to a close, just a note from me to thank you all for being an important part of the ASP in 2024. ASP members have continued to undertake amazing work across teaching, research, translation and outreach. As you will see in this newsletter, the initiatives the society supports and our member activities remain in a strong position. However, the ASP is not immune to the challenges that face all organisations and people at this time, and we are actively looking to support the ASPs activities, while maintaining control of the budget and supporting growth in income. In the following report, I highlight some of the ways where we can all make a contribution that will support the ASPs ongoing activities and benefit you, our societies members.

For new members, and as a reminder for longer-term members, I would like to highlight the ASP's mission as outlined in the strategic plan. The ASPs overall mission is to promote the field of parasitology – through Education, Communication and Support. The actions the ASP takes to support this are captured by actions such as Mentoring, Advocacy, Curriculum, Newsletter, Journals, Website, social media, Awards, Conferences, Courses, Collections and curations, and Outreach. In the following, I would like to highlight some of the work by ASP members that contribute to this ongoing mission.

The 2024 Concepts in Parasitology course is to be held at the UQ Moreton Bay Research Station from late November to early December. Along with our Australian based students, CIP will also teach a couple of international students through the provision of IJP and Elsevier sponsored ASP Disadvantaged Researcher travel bursaries. Thanks to co-convenors Michelle Power and Stuart Ralph for their efforts in organising the CIP course. Organising such an intensive and highly practical course is not without cost, and we encourage interested industry partners to support the efforts of the co-convenors and our experts who volunteer their time to support this flagship training opportunity for our future field leaders. On this note, I would like to thank Rebecca Bartzis and Pathtech whose sponsorship has provided access to pipettors for the CIP practical's and we look forward to working with Pathtech going forward. I would also like to encourage students who are interested in getting a wider grounding in parasitology and in learning new techniques to apply for CIP in 2025.

Finally for CIP, on behalf of the ASP I would like to thank Stuart Ralph for doing such a great job as convenor of the CIP course since 2019, and for his involvement in the program since 2017, with Stuart scheduled to step down from this role at the end of this year.

Congratulations to recent JD Smyth Postgraduate Travel Award winner Patrick

From the President's Desk continued

Tumwebaze from Griffith University who was sponsored to visit Prof Philip Rosenthal at the University of California. Congratulations also to Melissa Carabott, Jemma Hudson, Mukund Madhav and Sai Lekkala for their ASP Researcher Exchange, Travel and Training Awards.

Once again our members led some fantastic outreach activities, often with support and on behalf of the ASP. From Rina Fu running the Big DNA Workshop in Belmont, WA, to Shokoofeh Shamsi's public lecture on Parasites, Australia's silent threat, in NSW, and Kate Hutson presenting Parasites at the Beaker St Festival in Hobart, Tasmania, plus many, many more. Also thanks to ASP members who contributed to and organised MAM2024, the Malaria in Queensland 2024 Symposium and Trematodes 2024 meetings, as well as those who contributed to many other parasitology related conferences, meetings and workshops.

I just wanted to quickly highlight two ASP funded initiatives that have been led largely by volunteer ASP members. The first is the update on the Vet Text Book, which has had major contributions from David Emery, Shokoofeh Shamsi and Ian Beveridge, amongst others, that received Council approval for funding the final publication. We look forward to seeing this updated resource available to the community in the not too distant future.

Secondly is the Para-Site eBook initiative led by Peter O'Donohue that will feature illustrations by Katherine Trenholme. In addition, many subject matter experts have volunteered their time to check and validate the latest information on specific parasite species covered. I am pleased to pass on that draft text for this resource has been completed, but some sections still require review by subject matter experts. In this newsletter, we provide a list of parasites where review of the text by someone with expertise in that parasite would be of benefit. If you are an expert in one or more of the parasites listed, and are willing to provide a bit of time to review the text, please let me know via email, and I will pass your details onto Peter. If you are contacted by Peter directly to assist, I encourage you consider the request as this resource has been a significant undertaking by ASP members and such help in completing the information is greatly appreciated.

Much of the ASPs ability to support student and ECR training opportunities comes from the efforts and ongoing success of the societies three Journals; the International Journal for Parasitology, IJP-DDR and IJP-PAW. I am happy to pass on that led by the amazing efforts of the Journal editors, Brian Cooke for IJP, Kevin Saliba and Andrew Kotze for IJP-DDR, and Andy Thompson for IJP-PAW. With support from their editorial teams, our Journals have maintained highly competitive impact factors and cite scores, even as most other Journals in the field are seeing these numbers decline.

For IJP, the impact factor remained steady at 3.7, and with a notable drop in impact factor for equivalent Journals that focus on parasitology, the IJP remains the leading Journal devoted to all (diverse) fields of parasitology. Just a reminder that authors working at affiliated universities and Institutions in Australia and New Zealand can request the Open Access fee to be waived for their publications in the IJP as part of the Read & Publish agreement negotiated by the Council of Australian University Librarians and Elsevier.

IJP PAWs impact factor increased this year to 2, a significant achievement given the reductions seen for this metric in similar Journals. IJP-PAWs Scopus cite scores remain high at around 4, with these numbers highlighting the Journals strong reputation in the field.

IJP DDR has returned to a small profit on the back of increasing publications in 2023. The journal has maintained its strong impact factor of 4.1 and a healthy citation score of over 7.9 in 2023, again highlighting its strong reputation in the field.

As mentioned, the IJP suite of Journals are a key driver of the ASPs ability to support training and travel opportunities for our students and EMCRs. There are a number of things we can do to support the efforts of the editors and the Journal editorial teams to maintain and improve income to the ASP.

Firstly, we highlight in the ASP newsletter that for both established and EMCR researchers, agreeing to review manuscripts for our Journals to support the high standard of the work published is a great help to the Editors.

Secondly, I encourage all members to consider sending their manuscripts to our Journals. This not only supports ASPs income and strengthens the field leading research being published in our Journals, it also allows you to receive the 20% ASP member discount on open access publication charges and may also allow you to access the Open Access Fee waver for IJP.

Finally, please make international collaborators aware that when they are selecting a Journal to publish with, if they become international ASP members for the grand sum of $50 Australian, they too can receive the 20% ASP member discount on Open Access publication charges.

I would like to thank the Parasites in the Pacific Conference Organising Committee. This conference was a joint meeting between the Australian and New Zealand Societies for Parasitology and the 7th International Conference on Anaerobic Protists. The truly multi-disciplinary and international organising committee put together a great program. The Conference featured fantastic international speakers and also showcased the amazing research led by our students and ECRs. Attendees really enjoyed the Conference and getting to know our colleagues from New Zealand and across the world.

Next year I'm pleased to announce that the ASP Annual Conference will take place in Melbourne, from the evening of Monday 30th June - 3rd July 2025 at Melbourne Connect, Victoria. Details about how to register will be sent to members in the new year.

The Conference saw the awarding of the Bancroft-Mackerras Medal to Prof Jake

From the President's Desk continued

Baum (UNSW) and the John Frederick Adrian Sprent prize to Dr Melanie Ridgway (PhD at ANU), which recognised their outstanding achievements in parasitology for an established researcher and recently completed PhD student respectively. Both Prof Baum and Dr Ridgway thoroughly deserved the award and also gave really great presentations that showcased their work. The ASP Conference also marked the debut of the Bridget Ogilvie Medal that recognises an outstanding contribution in parasitology teaching. Prof Alex Maier (ANU) was awarded the Bridget Ogilvie Medal for his diverse contributions to parasitology teaching which is highlighted by his local classes and the relationships that have been built internationally from his teaching. We also recognise the ongoing contribution to the ASP of three members through the awarding of ASP Fellowships to Prof Shokoofeh Shamsi, Dr Peter Rolfe and Prof Robert Poulin. All three have made outstanding contributions to parasitology research, teaching and outreach that make them well deserved Fellows of the Society and we thank them for their ongoing contributions.

I would like to take this opportunity to thank our individual state representatives, ASP Educator Convenor Sarah Preston, ASP Archivist Haylee Weaver, Bancroft Mackerras Medal Convenor Alex Loukas and ASP Fellows Representative Robin Gasser for their contributions. A special mention for Outgoing Council members; the State Reps for NSW Michelle Power, Tasmania Nick Fountain-Jones, WA Narelle Dybing and Student Rep Jill Chmielewski for their service to the ASP. I look forward to working with our new Council members; State Reps for NSW Claire Sayers, Tasmania Kate Hutson, WA Breanna Knight and Student Rep Grace Peters going forward.

For their incredible and ongoing efforts in promoting and supporting the ASP's research, education and outreach activities, I would like to offer special thanks to Lisa Jones ASP Secretary and Executive Officer and ASP Research Network Convenor Nick Smith.

ASP Executive team, Ghizal Siddiqui Hayley Bullen and Danny Wilson, at the Parasites in the Pacific 2024 Conference.

Thanks also to the ASP Executive in Treasurer Hayley Bullen, Executive Secretary Ghizal Siddiqui and Outgoing President Rebecca Traub for their support and commitment through the year. I would like to highlight the contribution of Rebecca to the ASP over the last 4 years, myself, the ASP Council and our members greatly appreciate your efforts during one of the most disruptive times in recent memory. Thanks to you Rebecca, and all the best for your ongoing endeavours.

I am pleased to welcome incoming ASP President-Elect Aaron Jex to the Executive and Council. Aaron is no stranger to the workings of Council and is well known amongst ASP Members for his leadership in the parasitology field, providing a solid foundation from which to contribute over the coming years.

Thanks also to all members who applied for or enquired about positions on the ASP Council this year and I encourage people to apply for positions going forward. It is a real positive for the Society that we have many highly competent people interested in contributing to the Societies Leadership which will stand us in good stead into the future.

Finally, I would like to thank you, our members, who continue to support the ASPs activities, facilitate student and EMCR training and career development opportunities, outreach and recognition of all our members achievements. Have the best of Holiday seasons and I wish you all a prosperous New Year!

Best regards,

Danny Wilson

President of the ASP

www.parasite.org.au
www.facebook.com/ASParasitology
www.twitter.com/AS_Para

2024 Australian Society for Parasitology Annual General Meeting

The 2024 Australian Society for Parasitology Annual General Meeting was held as a hybrid face-to-face (at the Parasites in the Pacific 2024 Conference) and online Zoom meeting on Wednesday 28 August 2024 at 5pm NZST.

Business conducted

The following business was conducted at the 2024 Annual General Meeting of the Society. The minutes and reports for all ASP meetings are available on WildApricot/members/resources section. To access them please login to your Wildapricot account (https://asp.wildapricot.org/memberresources) and check the members resources or email the Secretary (secretary@parasite.org.au).:

- received the Society's financial statement, and audit report, for the last reportable financial year;
- presented the financial statement and audit report to the meeting for adoption;
- elected members of the Council (see positions vacant and nominating for ASP Council https://www.parasite.org.au/the-society/join-the-asp-council/);
- appointed an auditor or an accountant for the present financial year;
- announcement of ASP Awards and Prizes;
- receipt of reports from Editors, Convenors, Archivists, Secretariat and subcommittees; and
- review and debate other actions or decisions by the Council.

Congratulations to the following ASP Council representatives were elected at the ASP AGM on Wednesday 28 August 445pm NZST.

President-Elect, 2024
Aaron Jex has been elected into the position of President-Elect, 2024. He was nominated by ASP members Clare Anstead and Robin Gasser.

Treasurer, 2023
Hayley Rugarabamu (nee Bullen) was elected into the position of Treasurer, 6 September 2023. She was nominated by ASP members Rebecca Traub and Vito Colella.

Executive Secretary, 2023
Ghizal Siddiqui was elected into the position of Executive Secretary, 6 September 2023. She was nominated by ASP members Rebecca Traub and Vito Colella.

Victorian State Representative, 2024
Lucas Huggins has been elected into the position of Victorian State Representative, 2024. He was nominated by ASP members Sarah Preston and Jill Chmielewski.

New South Wales State Representative, 2024
Claire Sayers has been has been elected into the position of New South Wales State Representative, 2024. She was nominated by Jake Baum and Michelle Power.

Queensland State Representative, 2024
Swaid Abdullah has been has been elected into the position of Queensland State Representative, 2024. He was nominated by ASP members Nick Fountain-Jones and Alex Loukas.

Northern Territory Representative, 2024
Kamil Braima has been elected into the position of Northern Territory Representative, 2024. He was nominated by ASP members Narelle Dybing and Brian Cooke.

Tasmanian State Representative, 2024
Kate Hutson has been elected into the position of Tasmanian State Representative, 2024. She was nominated by ASP members Nicholas Fountain-Jones and Elise Ringwaldt.

Australian Capital Territory State Representative, 2024
Melanie Rug has been elected into the position of ACT State Representative, 2024. She was nominated by ASP members Kevin Saliba and Danny Wilson.

South Australia State Representative, 2024
Gerrut Norval has been elected into the position of South Australian State Representative, 2024. He was nominated by ASP members Danny Wilson and Swaid Abdullah.

Western Australia State Representative, 2024
Breanna Knight has been elected into the position of Western Australia State Representative, 2024. She was nominated by ASP Members Narelle Dybing and Ashleigh Peck.

ASP Student Representative, 2024
Grace Peters, PhD candidate at UNSW, has been has been elected into the position of ASP Student Representative, 2024 she was nominated by ASP members Nick Smith and Jake Baum.

ASP Fellows Representative, 2024
Robin Gasser has been elected into the position of ASP Fellows Representative, 2024. He was nominated by ASP members Danny Wilson and Narelle Dybing.

Bancroft-Mackerras Medal for Excellence winner, Jake Baum

Congratulations to Jake Baum who was awarded the 2024 Bancroft-Mackerras Medal for Excellence from the Australian Society for Parasitology.

Jake Baum receiving the 2024 Bancroft-Mackerras Medal for Excellence from ASP President Danny Wilson

Professor Jake Baum is a leading figure in parasitology, known for his groundbreaking work on malaria parasite biology, vaccine design, drug discovery, and diagnostic innovation. He began his career with significant contributions to host-pathogen coevolution during his PhD at the London School of Hygiene and Tropical Medicine. As a postdoc, he moved to Australia, to the Walter and Eliza Hall Institute (WEHI) in Melbourne, where he co-discovered the malaria protein PfRh5, a small protein that has ended up being pivotal in advancing the future of malaria vaccine development.

At the WEHI, Jake's research utilized cutting-edge techniques like super-resolution microscopy and cryoelectron microscopy, contributing major insights into the cellular mechanisms of malaria parasite invasion of red blood cells. His group's work on the actomyosin motor and the malaria ribosome structure has been highly influential, garnering extensive citations and facilitating structure-guided antimalarial drug design.

In 2013, after a decade in Melbourne, Jake moved to Imperial College London. As a Reader and then full Professor of Infectious Diseases and Cell biology, Jake expanded his group's research into drug discovery and diagnostics. His team screened thousands of compounds for antimalarial properties and developed digital diagnostic platforms. In the last three years at Imperial, Jake pivoted his research program to focus predominantly on the major challenge of developing next-generation malaria vaccines.

Jake was recruited to Head the School of Biomedical Sciences at UNSW Sydney, moving back to Australia with his family in 2022. At UNSW Jake continues his parasite work principally focussed on disruptive vaccine design and translation. Over his career, Jake has published over 120 papers, holds three patents, and has raised more than $25M in research funding. Jake has also been a mentor to junior researchers and a leader in the parasitology community, organizing conferences and supporting early career researcher events. His commitment to science education extends to public engagement activities, including innovative school-focussed projects on traditional remedies for malaria.

In recognition of his contributions to malaria science, Jake has been recognized with several awards, including a Victorian Tall Poppy Award, the WEHI Burnett Prize, the ASBMB Merck Millipore Research Medal and most recently 2023 the Research Australia Frontiers Award. In 2019 Jake was elected as a Fellow of the Royal Society of Biology in the UK.

John Frederick Adrian Sprent Prize winner, Melanie Ridgway

Congratulations to recently graduated PhD student Melanie Ridgway for winning the 2023 John Frederick Adrian Sprent Prize for her PhD thesis "Sex specific biology of *Plasmodium falciparum*".

Melanie Ridgway receiving the 2023 JFK Sprent Prize from ASP Secretary Ghizal Siddiqui (above and below)

Melanie studied Life Sciences as an Excellence-Major Scholar at Université Pierre et Marie Curie in Paris. For her Honours research project supervised by Dr. Adele Lehane and Prof. Kiaran Kirk at the Australian National University (ANU), she investigated ion transport and drug resistance in the malaria parasite Plasmodium falciparum. She joined Prof. Alexander Maier's lab for her PhD at ANU, where she developed a method to separate male and female *P. falciparum* gametocytes and subsequently investigated their sex-specific biology.

During her candidature, Melanie investigated three major areas:

Plasmodium lipid dynamics in the mammalian and mosquito host.

Melanie determined the lipid composition of different asexual stages in the human malaria species *P. falciparum* and the murine malaria species *P. berghei.* She also looked at the scavenging of host lipids and correlated the lipid profile of the parasite with the available host cell lipids in the different host species (which she also determined). Finally, she compared the lipid composition of the mosquito host to the lipid composition of the transmissible sporozoite stage. Melanie identified essential lipid species that are taken up from the various host environments, which are crucial for the growth and propagation of the parasite. This led to a publication in the ASP's International Journal for Parasitology (2020)

Development of a novel method to separate male and female gametocytes.

Melanie developed a system that allows the separation of a large numbers of male and female gametocytes. Although morphologically distinct, it was previously not possible to purify pure populations of either sex, which hindered the analysis of sex-specific characteristics. Thanks to Melanie, this is now possible, and several labs are using the system to shed light on the differences between male and female gametocytes. The system is also used for drug screens. Previously, only the effect of drugs on total gametocyte numbers could be assessed. This is less informative given that *P. falciparum* produces 4 times more female than male gametocytes. Even drugs that selectively kill male gametocytes at very low concentrations (and therefore would be terrific transmission blocking agents) would have been dismissed as poorly acting drugs, since the remaining 80% female gametocytes would have survived. She applied this technique not only to elucidate the sex-specific lipidome of *P. falciparum*, but also to determine sex specific methylation patterns. This work led to the publication in m-Sphere (2020) and Bio-protocols (2021).

JFA Sprent Prize winner cont...

Sex-specific lipid metabolism in *P. falciparum* gametocytes

When malaria parasites are transmitted from the human to the mosquito host, they encounter completely different environments which is also reflected in the available lipids. By conducting a comprehensive stocktake of the available lipids, Melanie discovered that host sphingomyelin and neutral lipids are essential for the transmission of the parasites and hence interference with their uptake and storage might provide novel intervention strategies to stop transmission of the parasite. These results were published in 2016 Malaria Journal and in 2022 in the Journal of Cell Science.

In addition, during her PhD candidature, Melanie has contributed to a publication on the sensitivity of *P. falciparum* to the drug ketotifen, which was published in the International Journal for Parasitology Drugs and Drug Resistance (2016).

Melanie is an accomplished science communicator and champion or parasitological research. During her PhD she won multiple Three Minute Thesis prizes and a student presentation prize from the Australian Society for Parasitology and Melanie organised the outreach activities of the ANU parasitology groups for National Science Week in 2016 – 2019 and was a University finalist of the Three Minute thesis competition in 2017 (https://www.youtube.com/watch?v=D4Qbf0TN6Sk).

Melanie graduated in December 2019 with a thesis entitled: "Sex-specific biology of the malaria parasite *Plasmodium falciparum*".

Melanie is an exceptional scientist and has not only made substantial contributions to our understanding of the fundamental biology of malaria parasites, but also identified new leads for intervention strategies. She has also developed much-needed tools that has and will continue to have a significant impact in the years to come.

Melanie Ridgway is a very worthy recipient of the 2023 John Frederick Adrian Sprent Prize.

Melanie Ridgway with PhD superviser, Alex Maier.

Bridget Ogilvie Medal winner, Alex Maier

Congratulations to Alex Maier who was awarded the 2024 Bridget Ogilvie Medal of the Australian Society for Parasitology

Alex Maier is Professor at the Research School of Biology at the Australian National University in Canberra. Through functional genomic, cell biological and biochemical approaches he is trying to untangle the molecular machinery underlying key survival mechanisms of the malaria parasite *Plasmodium falciparum*. His interests include host cell remodeling, lipid metabolism and sexual differentiation. More generally, he is fascinated by the question how parasite-host interactions shape the web of life. Alex is a dedicated educator and shares his passion for parasites with students and the public at large.

Alex has received several awards in recognition of his work, including Fellowships by the Australian Society for Parasitology, the Australian Society for Microbiology, the Alexander-von-Humboldt foundation and the Australian Research Council. He was finalist in the Eureka awards and a Laureate of the Khwarizmi International award. He was selected as the "Australian Science Teacher of the Year" (2023) and is a senior fellow of the Higher Education Academy.

The Bridget Ogilvie Medal of the Australian Society for Parasitology is an award for an Ordinary member or Fellow of the ASP who, in the opinion of the selection committee appointed by Council, has made an outstanding contribution to parasitology education. https://www.parasite.org.au/awards/the-bridget-ogilvie-medal/

2024 Bridget Ogilvie Medalist, Alex Maier, parasitized (right),at the Parasites in the Pacific 2024 Conference and in the laboratory, Australian National University (below).

ASP Fellowship awarded to Shokoofeh Shamsi

Congratulations to Shokoofeh Shamsi 2024 Fellow of the Australian Society for Parasitology Inc., awarded at the 2024 ASP AGM. The citation for Shokoofeh's Fellowship is published below

Shokoofeh Shamsi receiving her ASP Fellowship from ASP Secretary Ghizal Siddiqui

Professor Shokoofeh Shamsi has been a member of the Society for over 20 years. After completing a Bachelors and Masters Degrees in Iran she moved to Australia and was awarded a PhD for research in fish parasitology from the University of Melbourne in 2007. Professor Shamsi entered an academic career at Charles Sturt University (CSU) in 2010 and in 2022 she was promoted to the status of Professor in Veterinary Parasitology on account of her academic achievements, the scope of her public engagement and her service to the University.

Professor Shamsi has promoted the advancement of parasitology, in particular through her research publications, international reputation, supervision of postgraduate students, the public promotion of the awareness of parasitic disease and contributions to Committees of the Society. She has also been active in championing the role of women in science. In 2022 she was the recipient of a Scholarship that enabled her to attend the Women's Leadership Summit in Sydney.

Her main field of research is parasites of fish, although the host range she has investigated includes fish, reptiles, pangolins, dasyurids, crustacea and birds. She has described 39 new parasite species predominantly of monogeneans and nematodes. Professor Shamsi has published around 140 papers which have been cited thousands of times (2607 at last count). Interest in her work has led to five invitations to present plenary or keynote talks.

Her awards are many and include several teaching and research performance awards from CSU, international recognition. Examples are from India and from the International Association of Zoologists.

She has undertaken laboratory exchanges to Rome, South Africa, India and Japan and hosted scientists from Iran, Brazil, Singapore, Poland, Spain, India, France and the Netherlands. Prof. Shamsi has also collaborated widely with Australian experts in fish parasitology. Research funding is challenging in this area of research. Nevertheless, she has received more than $1M, including funds from international agencies.

Professor Shamsi maintains an undergraduate teaching load and enthuses students through her parasitology teaching such that many undertake research with her and her colleagues. She has supervised 48 postgraduate students including 25 in the last 5 years, 12 for PhDs. In addition, she has also supervised 22 undergraduate research student projects. With these students she frequently leads an impressive cohort, often the most numerous from a single institution, to each annual ASP conference. Many of those have been distinguished by winning ASP student conference prizes.

A major activity of Professor Shamsi's career has been public education of the zoonotic threats from fish parasites, in particular, the anasakids. One landmark outcome of her work was inclusion of these diseases in medical curricula in Australian universities. A second was that her work prompted national seafood safety risk assessments by the Australian Food Safety Information Council. A career highlight that cements her authority in the field was authoring the chapter 'Nematodes and Closely Related Taxa' in Encyclopaedia of food safety in 2023. Her media appearances number over 90, a remarkable achievement and evidence of deep commitment and consistent endeavour.

Professor Shamsi's expertise is recognised through serving on many committees including the boards of the World Federation of Parasitologists (2022-2026) and the Food Safety Information Council (2021-2023) to name just two. She also sits on the following journal editorial boards: Parasitology Research (2017-current), Clinical Microbiology Reports (2022- current), the International Journal of Food Microbiology (2020 – current), the International Journal of Environmental Research and Public Health (2020 – current) and the World Register of Marine Species (2011 – current).

ASP Fellowship cont...

In terms of the ASP, Professor Shamsi has worked tirelessly and has rendered conspicuous service to the Society. She was the NSW State Representative (2015-2018) and Executive Member of the Council (2019-2021). Her commitment to the promotion of parasitology through education is evident in her long-standing membership of the Education Committee of the ASP (since 2016) and her membership of the Future of the Society group of the Australian Society for Fish Biology (since 2020). Professor Shamsi has applied her skills in public engagement through a number of parasitology-related Science Week events, including hosting an online 'Parasites and Art' event with the ASP in 2020. She co-editor of the up-coming, second edition of the ASP-sponsored e-publication 'Australasian Animal Parasites, Inside and Out'.

In conclusion, we believe that Shokoofeh Shamsi has promoted the advancement of parasitology and rendered conspicuous service to the cause of parasitology and to the Society. She has been a true ambassador of Australian Parasitology and is a deserving recipient of the award of Fellow of the Australian Society for Parasitology.

Shokoofeh Shamsi giving a speech after her ASP Fellowship award (above) and with her Charles Sturt University research team (below) at the Parasites in the Pacific 2024 Conference.

ASP Fellowship awarded to Peter Rolfe

Congratulations to 2024 Fellow of the Australian Society for Parasitology, Peter Rolfe, awarded at the 2024 ASP AGM. The citation for Peter's Fellowship is published below

Peter Rolfe receiving his ASP Fellowship award from ASP Secretary Ghizal Siddiqui

Peter Rolfe is one those "busy bees" of parasitological experience and contribution, utilising expertise learned and gained from a variety of "parasitological pursuits and postings" and flitting from project to project, fertilising R, D & E operations with incisive research contributions and managerial skill. He is a unique researcher and parasitologist, with a broad church of inputs around the globe in all aspects of veterinary parasitology, especially livestock parasite control and management. He is a truly an "integrated parasite manager" (IPM) in the true sense of the acronym. He is also an astute research and business manager.

The Research Career and accumulation of wisdom!

After graduating with Honours in the Faculty of Veterinary Science, University of Sydney, 1977, Peter joined the University's Rural Teaching Clinic at Camden, initially as an intern and then as a resident clinician. And was awarded a Postgraduate Diploma in Veterinary Clinical Studies (1978). His extensive industry experience commenced in 1981 at Grafton with NSW Dept Primary Industry and later at Glenfield in 1984. In that year, he commenced his PhD part-time on liver fluke with that legend and nemesis of Fasciola hepatica, Dr Joe Boray, completing it in 1990.

From 1997 to 1999, Peter Rolfe was the resident Director for a not-for-profit "Teen Ranch", based at Cobbitty NSW, providing activity-based camping to around 5000 young people each year. He was responsible to the Board of Directors, supervision of 25 full time staff and approximately 300 regular volunteers, marketing, promotion and asset management. It was this business acumen that he brought to the ASP Treasurer position in 2015. Peter held the position of ASP Treasurer from July 2015 – June 2017.

Subsequently, Peter moved States to become laboratory manager of the Yeerongpilly Veterinary Laboratory, Animal Research Institute, Queensland Department of Primary Industries for 2 years. He managed approximately 40 staff that provided veterinary diagnostic services to the rural industries in Queensland, including arbovirus and other sentinel monitoring programs, BSE surveillance, EBL and TB eradication, anthrax and botulism outbreak management, remote disease surveillance trials and acaricide resistance surveillance.

Peter was "head-hunted" and recruited to Meat and Livestock Australia in 2000 as Project Manager, Animal Health and many of us met and were impressed with him in that role. Over the ensuing 4 years, he was responsible for identifying suitable research providers, contracting these organisations, monitoring and reporting the research outcomes and identifying and protecting valuable IP and implementing technology transfer for the adoption of the research solutions.

Peter's "Industrial Career" commenced in 2004 when he was recruited by Pfizer Animal Health as a Project Team Leader (Sydney) and responsible for a global development team of scientists from New Zealand, United Kingdom, USA, Taiwan and Australia. From 2005-9, an interlude occurred when Peter joined the Australian Centre for International Agricultural Research (ACIAR) as a Research Program Manager, Animal Health in control of extension programs and transboundary

ASP Fellowship cont...

disease.

He was back to the pharmaceutical bench in 2013 when he joined Novartis Animal Health at Badgerys Creek as Senior International Project leader, Life Cycle Management, Australia, New Zealand, Latin America and Asia. He was involved in developing chemical control products ("commercial- in-confidence " naturally) use in pigs, cattle, sheep and poultry with technical transfer and advice for research providers around the globe.

With the purchase of Novartis by Elanco, Peter continued in pharmaceutical development and external innovation relevant for the R&D pipeline for and the Asia Pacific region for all animal species.

In 2020 he "retired" (not ever as he still had much to offer) and commenced a consultancy business (Veterinary Health Innovation) in the animal health sector. In 2021 to this day, he has a part time role as District Veterinarian, Local land Services, based at Yass NSW, where he reliably informs use that Ostertagia and Trichstrongylus (members of the HOT nematodes) still plague the beef cattle industry. Meantime he still runs his own sheep and cattle, so he knows what he is talking about!

Those research contributions

So as exemplified, Peters research interests are diverse and reflect the various employment postings over his career with "Big Pharma" and Funding bodies. They span both internal and external parasites, especially the epidemiology, diagnosis, treatment, control and management of internal and external parasites of cattle, sheep, horses and dogs. In additional Peter has been centrally involved in experimental model development for gastrointestinal nematodes of ruminants, dogs, as well as filariids, and acarines (ticks and lice).

During his time in Industry, Peter's research has concentrated on parasites of the highest economic importance for the profitability of livestock and the health and welfare of companion animals. Initially with DPI, NSW, he examined Closantel resistance

Peter Rolfe

in *Haemonchus contortus* including its characterisation, genetics and alternative strategies for control, while isolating and preserving defined strains for later genetic work. Other research defined and characterised ivermectin and moxidectin resistance in the sheep nematodes Ostertagia spp. and Haemonchus and identified and tested control options for industry uptake.

From his stints with Industry, he has made instrumental contributions to developmental R&D (and market support) for new anthelmintic classes in livestock. These included Derquantel, Monepantel (Zolvix); with inputs throughout the R, D & Extension pipeline around: – global clinical development including target animal efficacy in Australia, New Zealand, Europe, United States and Brazil (sheep, cattle, goats and horses), target animal safety, regulatory affairs. The contributions also encompassed AVPMA applications for registration or emendations for these products.

While involved in chemical control developments, Peter also contributed to discovery and preclinical development of Trematicides (Flukicides- as was his favourite from doctoral days!), as well as Dicyclanil for the management and control of Lucilia cuprina (sheep fly-strike) in Australia and Fluazuron to control flystrike in Australia and Brazil. He has also found time for some discovery research on heartworm!

From his conventional and Industrial research career, Peter has 28 peer-reviewed research papers, 1 book chapter, a great heap of consultancy reports and a huge range on confidential internal Industrial trial reports (we cannot confirm or deny that last rumour!). And 3 patents.

The International Scene

Internationally, Peter is an influential parasitologist whose advice was sought through consultancies to the Eastern Islands Veterinary Services Project, Indonesia in 1990-4 that concentrated on the training of field and laboratory staff in diagnosis and control of parasitic diseases. He oversaw fluke control projects in Bogor, Indonesia in 1988 and in 1994 at Lechang, China, he and advised on parasite and animal health issues for the developing pasture based beef industry on acidic soils.

Peter has provided reviews to the National Registration Authority (now APVMA), both as a primary and secondary reviewer, on efficacy and safety submissions for anti-parasitic products.

He has also been responsible for the co-ordination of parasite control programs for sheep in NSW (Drenchplan and Wormkill) from 1990 to 1993 and later as technical consultant to those groups and subsequently, extended these applications into overseas projects and to modelling programs for the field introductions of new anthelmintics.

Contributions to the ASP

So how do the financial operations of the ASP flow so smoothly and you get you funds so efficiently and effectively? It was

ASP Fellowship cont...

not always the case!!

In 2015, Peter joined (or was cajoled into!) the Sydney-based ASP Executive. We could sense his mounting frustration with part-time accountants and the laborious cheque-based operation and the disjointed financial reporting in grants, awards and servicing.

So Peter blew it up!! He utilised his business expertise to introduce "Xero" and Commbiz and completely overhauled the whole of ASP financial operations, dispensing with paper trails and book keepers to introduce the streamlined and integrated system that we have today. It was a game changer for the Society that cannot be overstated. With savings in time and dollars, it enabled the ASP Executive to make the appointment of an Executive Officer (Lisa of course!!) who was trained in Xero and could dispense with the financial operations with one hand tied behind her back. And all due to the prescience and presence of Peter Rolfe.

Post that period, Peter has continued to contribute across worm and tick control programs in his own employment as well as a member of ASP and WAAVP.

Conclusion

In view of his broad and highly incisive contributions to the discipline and his seminal contribution to ASP financial operations, Peter Rolfe is an extremely worthy recipient of the title, Fellow of the Australian Society for Parasitology.

Peter Rolfe with Lisa Jones (above) and Ghaz (below) at the Parasites in the Pacific 2024 Conference

ASP Fellowship awarded to Robert Poulin

Congratulations to 2024 Fellow of the Australian Society for Parasitology, Robert Poulin, awarded at the 2024 ASP AGM.

Robert has been a member since 1993 and has made a major contribution to the Society primarily through his long term role as a specialist editor for the International Journal for Parasitology 2001-2003, 2007-2016, one of the longest specialist editors for the Journal and contributing to it in an exemplary fashion. Robert was on the board of IJPPAW from 2012-2016.

His academic record is outstanding, he is a word leader in the field of parasite ecology and evolution, being the author of the standard text in this discipline, now in its second edition including a translation into Japanese and book on parasite diversity co-authored with Prof. Serge Morand. His standing in the international field of parasitology is clearly indicated by being an invited speaker at ICOPA in 2002, 2006, 2010, 2014, as well as at numerous other international meetings, including being an invited speaker at ASP meetings in 1998, 2007 and 2015. With over 600 publications in international, peer-reviewed journals and with H indices of 83 (Web of Science) or 105 (Google Scholar), his scholarly achievemnets place him in the very highest tier of our discipline. In our view, he is indisputably the pre-eminent leader globally in the area of parasite ecology.

In New Zealand, he has been pivotal in maintaining and advancing ecological and evolutionary parasitological studies through the development of a highly productive research group at the University of Otago, with numerous post-graduate students. This group integrates parasitology in a truly interdisciplinary approach, appying the most cutting-edge theories and methodologies from other disciplines to the study of parasite ecology and evolution.

In view of Robert's remarkable contributions to parasitology globally as a member of our Society, Robert Poulin is an extremely worthy recipient of the title, Fellow of the Australian Society for Parasitology.

Robert Poulin

Lisa Jones interviewed Robert at the Parasites in the Pacific Conference to find out about his parasitology life story.

R: "I was always interested in biology. At University I studied ecology and evolution, but it was during my PhD at Université Laval in Quebec, when I was field sampling and found parasites on small fish when I was first interested in parasites. I was meant to focus on the factors that affect growth and survival of stickleback fish. However, I saw these parasites, brought the fish back to the lab, did some experiments, and discovered that the behaviour of the fish was altered by the parasites. So I changed my PhD focus to look at parasites and fish behaviour."

"I collected the fish with nets, and when placed in a bucket they didn't swim as well as other fish, they swam close to the surface, and this confirmed that there was a behavioural effect."

"I could tell the largest parasite was a crustacean, but there was nothing in the library about parasitology, so I sent the parasite to a specialist in fish parasites across the other side of the country who confirmed the species of parasite, and this is how I became a parasitologist, by accident!"

"I identified all of the parasites on these fish and learned their lifecycles. My research also stimulated more students to study parasites. We tested behaviours in large tanks of groups of fish with parasites and the schooling behaviour of fish with parasites - they tended to hide themselves in a group."

"After my PhD I joined Magill University – Institute of Parasitology as post doctoral fellow and thought of myself as a parasitologist, I was no longer the odd one out!"

"During this time I kept my interest in

Interview with Robert Poulin

ecology and evolution, researching parasites in the perspective of ecology and evolution. How parasites were shaping the evolution of their host, and how the parasites evolved phenotypically. Looking at how eggs can change across hosts. At higher lattitudes do they change the offspring of parasites? Investigating, is it host or environment?"

"Methods to test this have evolved over the years, statistical analyses are now available and the results are still consistent. Broad patterns have survived the test of time."

Robert's research expanded into endoparasites and he had another career move.

R: "At that point my main research interest was in fish and ectoparasites, and behaviour, how does the behaviour of the fish influence whether the fish are infested by parasites. Then I started looking at helminths, and had my first look at endoparasites."

"I was working at the University of Quebec, Montreal, teaching and still researching during the summer. I almost left research all together but in 1991 I had a phone interview with Otago University, got the job and moved to Dunedin. I was offered a tenured position and I am still in Dunedin and I love living there."

"At Otago University I research native animals and parasites. Native endemic species, fish parasites, insects, crustaceans, birds, my research spans different parasites. Trematodes are favourites, and cater to the interest of students, it fits within the broader scope of interest and leads to opportunities for the students. We study avian malaria, toxoplasmosis in seabirds, wildlife parasitology, and ecological parasitology."

"Today my research focus is looking at the microbiome of helminths, how it affects how the parasite interacts with the host, and how it affects the parasite."

"There is different bacteria living inside of the parasites and this changes the behavour/colour of the host and the microbes they harbour."

"We collect parasites, wash them so there's no parasites of the host. And larger worms we brush with ethanol. We use primers for bacterial genes, and using metagenomics, sequence everything, using bioinformatics to look at everything that lives in that particular worm. We are also interested in viruses."

Robert Poulin at the Parasites in the Pacific 2024 Conference

Parasites in the Pacific 2024 Conference dinner

Robert and his students show passion, concern and curiosity for the environment.

R: "Through concerns about changes to the climate, we are studying host-parasite interactions. We are worried about how climate change will create greater disease for our wildlife, and want to understand how these changes that are happening now will impact the natural world of tomorrow. What are the important drivers?"

Robert says he wants to see improvements in how we do science, parasitology research, and ecological parasitology. He has published about how taxonomy can be improved.

Robert says he is motivated by his students, their passion, enthusiasm, and seeing them graduate and getting work. Robert has mentored 75 early career researchers in total, 28 PhD students, 28 post-doctoral researchers and 19 Masters students. Robert is supporting the next generation of parasitologists.

R: "It's my greatest contribution, training and mentoring students, and many are doing so well, they will eclipse the work I've done. Seeing students do well drives me more than publishing papers and winning grants."

Meet the ASP President-Elect

Aaron Jex has been elected into the position of President-Elect, 2024. He was nominated by ASP members Clare Anstead and Robin Gasser.

Associate Professor Aaron Jex is co-appointed in the Faculty of Science of the University of Melbourne and as lab head in the Population Health and Immunity Division of the Walter and Eliza Hall Institute of Medical Research. Aaron has been a member of the ASP since 2002, has served as ASP Treasurer, co-chaired and co-organised the ASP Annual General Meeting and Conference in Melbourne in 2014, and helped found and has served on the management and education committees for the ASP Concepts in Parasitology course since its inception (particularly the Trivia night). A/Prof Jex is a current NHMCR L1 Leadership Fellow. His research team focuses on the genomics, molecular biology and population genetics of a wide variety of gastrointestinal and urogenital parasites, including Giardia, Cryptosporidium, Trichomonas and soil-transmitted helminths, and has made contributions to understanding of malaria, parasitic arthropods and trematodes. He research also includes extensive collaboration with the Australian water sector and involves surveillance for waterborne pathogens, toxigenic cyanobacterial, emerging viruses and markers of antimicrobial resistance.

ASP President-Elect, Aaron Jex (above) and (below) with ASP President Danny Wilson (R) at the Parasites in the Pacific 2024 Conference

Meet the ASP State Representative from Tasmania

Kate Hutson was elected into the position of Tasmania State Representative, 2024 at the 2024 ASP AGM on Wednesday 28th August 2024. She was nominated by Nicholas Fountain-Jones and Elise Ringwaldt.

Kate Hutson was elected to the position of Tasmanian State representative at the last ASP AGM in Auckland on 28th August 2024.

Kate completed an Honours degree on parasites of shellfish and fish at the University of Melbourne with Ian Beveridge and Robin Gasser. She then went on to a PhD and postdoctoral fellowship in Marine Parasitology at the University of Adelaide with Ingo Ernst and Ian Whittington where her work centred on parasitic diseases of wild and farmed fishes. In 2010 she moved to James Cook University and established the Marine Parasitology Laboratory in the Centre for Tropical Fisheries and Aquaculture where she completed 10 PhD, 7 MSc and 5 Honours students in experimental parasitology and disease ecology.

In 2019 Kate moved to Aotearoa New Zealand for a position as Team Leader - Aquatic Animal Health for the Cawthron Institute. Cawthron is NZ's largest independent science organization and a charitable trust whose scientific research is strongly aligned with New Zealand's marine and freshwater environments and resources. For the past six years Kate has led and managed large-scale R&D programmes, commercial testing services, and consultancies. She championed the build of New Zealand's first dedicated Aquatic Biocontainment PC2 Facility (funded by Cawthron and officially opened in 2022) which has transformed NZ's research capacity and will leave a legacy in aquatic pest, disease, and contaminant research.

Kate works across a diverse portfolio in aquatic animal health and marine disease ecology including aquatic wildlife, fisheries and aquaculture. She currently leads a Ministry for Business Innovation and Employment enabled Endeavour programme, Emerging Aquatic Diseases (Emerging Aquatic Diseases Research Programme - Cawthron Institute), and partners with industry, government and first nation peoples (M ori). From 2022 Kate has worked remotely for Cawthron from Hobart, Tasmania, and is Adjunct Associate Professor at JCU.

Kate and her family live on a small acreage in the idyllic hamlet of Allen's Rivulet, south of Hobart. She hand-milks her small herd of dairy goats to make cheese and soap …and does her goat's faecal egg counts.

ASP State Representative, Tasmania, Kate Hutson

Meet the ASP Student Representative

Grace Peters, PhD candidate at UNSW, has been has been elected into the position of ASP Student Representative, 2024 she was nominated by ASP members Nick Smith and Jake Baum.

ASP Student Representative, Grace Peters

Hi, my name is Gracie. I am a PhD candidate at the University of New South Wales, where my research focuses on investigating protective memory T-cell formation in malarial disease, towards next-generation malaria vaccines. I completed my undergraduate degree in Biomedical Science at the University of Technology Sydney with First Class Honours in 2023. For my honours project, I studied host-pathogen interactions in Mycobacteria, and more specifically how mitochondrial homeostasis in host cells is impacted by infection with Mycobacterium abscessus for which I received the Dean's Award for Academic Excellence. Whilst at UTS, I was first introduced to parasitology under the tutelage of Dr Michael Johnson and Professor Nick Smith, where I went on to be awarded the Australian Society for Parasitology's Undergraduate Award. Following this, I moved to the University of New South Wales, where I am about to commence the second year of my PhD in Professor Jake Baum's lab. For my PhD, I am interested in looking at cellular immunity— and in particular CD8+ T cell dynamics — in response to infection and immunisation in Plasmodium falciparum and P. berghei models. To this end, we are currently collaborating with several labs, both domestic and overseas, to capitalise on novel antigen discovery techniques with a focus on harnessing T cell immunity in the context of pre-erythrocytic malaria through vaccination.

I have previous experience in student engagement, both in employed positions at the University of Technology Sydney as a Faculty of Science ambassador and Accessibility and Disability Support worker; as well as in a volunteer capacity where I served as the senior convenor for the United Nations Youth State Conference, among other large events. I am passionate about science communication and would love the opportunity to promote the work of higher degree research students in the Society as I believe that this is a great way to foster an environment of collaboration at the student level, as well as to support their successes, which often go underacknowledged. I am eager to continue the work of the outgoing ASP Student Representative; to keep growing the student body of the Society, and to continue making it a safe and positive community for HDR students working in parasitology.

Meet the ASP State Representative from New South Wales

Claire Sayers was elected into the position of New South Wales State Representative, 2024 at the 2024 ASP AGM on Wednesday 28th August 2024. She was nominated by Jake Baum and Michelle Power.

ASP State Representative NSW, Claire Sayers

Claire completed her PhD with Geoff McFadden and Dean Goodman at the University of Melbourne and identified new apicoplast putative membrane transporters in malaria parasites. In 2017, she moved to the UK for a postdoc with Oliver Billker at the Wellcome Sanger Institute and later relocated with the Billker Lab to Umeå University in Sweden. Using barcoded PlasmoGEM knockout vectors, Claire conducted the first fertility screen in malaria parasites and identified hundreds of putative fertility genes. In 2022, she returned to Australia and joined Jake Baum at the University of New South Wales Sydney. Claire is currently using her experience with genetic barcodes to study malaria transmission dynamics and maintains an interest in understanding the molecular basis of fertility.

Meet the ASP State Representative from Western Australia

Breanna Knight was elected into the position of Western Australia State Representative, 2024 at the 2024 ASP AGM on Wednesday 28th August 2024. She was nominated by ASP Members Narelle Dybing and Ashleigh Peck.

Breanna recently completed her PhD at Murdoch University, where she focused on detecting gastrointestinal parasites and antimicrobial resistance in dogs, particularly concerning critically important antimicrobials for human medicine. Currently, she is working as a research assistant at Murdoch, exploring various projects that primarily investigate gastrointestinal parasites affecting humans. Outside of her research, Breanna enjoys spending time with her sausage dog, Wally. She is very excited to serve as the next WA representative for the ASP.

ASP State Representative, WA, Breanna Knight (above) and (below right) with Charlotte Oskam (L) Narelle Dybing (middle) at the Parasites in the Pacific 2024 Conference

Congratulations to ASP Undergraduate prize winners

ASP Undergraduate Prize winners from Federation University, Maria Mendez Garcia (left with Sarah Preston) and Alarna Young (above right)

Congratulations to 2023 ASP Undergraduate Prize winners from Federation University, **Maria Mendez Garcia** who won the highest mark in Case Studies in Animal Management where we discuss flystrike control as a wicked problem and **Alarna Young**, Alarna won the highest grade in Animal Management and Disease.

Congratulations to ASP Undergraduate prize winners

Congratulations to 2023 ASP Undergraduate Prize winners from Charles Stuart University, **Lillian Smith** (VSC323), **Tammy Wiehl** (ASC305), both dedicated students and very worthy recipients.

Congratulations to 2023 ASP Undergraduate Student Prize Winner from The University of Adelaide, **Sophia Kim** pictured here receiving the award from A/Prof Ryan O'Handley.

2023 ASP Undergraduate Student Prize Winner Sophia Kim (L) with A/Prof Ryan O'Handley (R) from The University of Adelaide,

Congratulations to ASP Undergraduate prize winners

Congratulations to 2023 ASP Undergraduate Prize winner **Keanje Van Zyl** from James Cook University

JCU Prizes

Student Testimonials | 2023 Prize Winners

JAMES COOK UNIVERSITY AUSTRALIA

Prize: Australian Society for Parasitology

Prize Recipient Name: Keanje Van Zyl

Degree: Bachelor of Veterinary Science (Honours)

Hello,

I am writing to extend my heartfelt gratitude for your generous support as donor of the Australian Society for Parasitology Prize. Winning this award has been an incredible honour and a testament to the hard work and dedication I have invested in my studies.

Your contribution not only recognises individual achievement in the field of parasitology, but also acknowledges the wonderful parasitology lecturer at James Cook University. Their dedication to educating and inspiring students like me has played a significant role in shaping my academic journey and passion for parasitology.

Your generosity provides invaluable encouragement and motivation to aspiring professionals like me.

Once again, thank you.

Keanje Van Zyl

Thank you for supporting students at JCU
www.jcu.edu.au/jcu-prizes

2023 ASP Undergraduate Student Prize Winner Keanje Van Zyl from James Cook University

Congratulations to our ASP Student Prize winners at PiP2024

2024 ASP Student Prize winners at the Parasites in the Pacific Conference in Auckland from left to right: Xavier Barton (Murdoch University), Ashleigh Peck (Murdoch University) , Jessica Home (University of Melbourne), Ashton Kelly (University of Queensland) and Ernest Teo (Hokkaido University/University of Queensland)

Congratulations to our 2024 ASP Student Prize winners at the Parasites in the Pacific Conference in Auckland!

- **Jessica Home (University of Melbourne)** won Best overall conference presentation for her talk "Unravelling clindamycin resistance in malaria",
- **Xavier Barton (Murdoch University)** won Best 15-min presentation for his talk "Population Genetic Structure of Amblyomma triguttatum in the Swan Coastal Plain of Western Australia",
- **Ashleigh Peck (Murdoch University)** won Best 5-min presentation for her talk "Mosquito-Borne Parasite Surveillance in Perth, Western Australia.",
- **Ashton Kelly (University of Queensland)** received Runner-up for Best 15-min presentation for her talk "Defining the molecular basis of inter-individual variation in control of Plasmodium parasite load", and
- **Ernest Teo (Hokkaido University/University of Queensland)** received Runner-up for Best 5-min presentation for his talk "What allows ticks to tick? The effects of climate on the geographic distribution and the abundance of ticks.".

Congratulations to our ASP Student Prize winners at PiP2024

2024 ASP Student Prize winners receiving their awards from ASP President, Danny Wilson at the Parasites in the Pacific Conference in Auckland clockwise from top left: Jessica Home (University of Melbourne), Xavier Barton (Murdoch University), Ashleigh Peck (Murdoch University), Ernest Teo (Hokkaido University/University of Queensland) and Ashton Kelly (University of Queensland) .

#PiP2024 Conference

We would like to acknowledge the generous support of our Parasites in the Pacific 2024 Conference sponsors, thanks to Elsevier Parasitology and the International Journal for Parasitology (IJP), IJP DDR and IJP PAW, Beef + Lamb New Zealand Ltd, Elanco, New England Biolabs, eLife, Tourism New Zealand, Tataki Auckland Unlimited, MDPI, Pathogens, and Parasitologia, Auckland Medical Research Foundation and Maurice and Phyllis Paykel Trust.

Our Parasites in the Pacific 2024 Conference sponsors, thanks to Elsevier Parasitology and the International Journal for Parasitology (IJP), IJP DDR and IJP PAW, Beef + Lamb New Zealand Ltd, Elanco, New England Biolabs, eLife, Tourism New Zealand, Tātaki Auckland Unlimited, MDPI, Pathogens, and Parasitologia, Auckland Medical Research Foundation and Maurice and Phyllis Paykel Trust.

Parasites in the Pacific 2024 Conference

Tenã koutou katoa,

Nau mai, haere mai ki Tãmaki Makaurau, Aotearoa!

Greetings to you all,

Welcome, welcome to Auckland, New Zealand!

Parasites in the Pacific 2024 Conference (PiP2024) took place in Auckland, New Zealand from Monday 26th – Thursday 29th August 2024 at The University of Auckland.

The Annual ASP Meeting took place this year at the Parasites in the Pacific 2024 Conference (PiP2024), this was a joint meeting of the Australian and the New Zealand Societies for Parasitology and the 7th International Conference on Anaerobic Protists. The PiP2024 Conference attracted 190 delegates from around the world. You can download the Conference program online to read all of the abstracts.

The Conference opened with an amazing Māori Cultural Performance at The University of Auckland on Monday August 26 from 6pm. The Conference scientific program ran across three full days from, Tuesday August 27, 2024, 830am and concluded with dinner at Wintergarden at The Civic, Auckland on the evening of Thursday August 29, 2024.

The scientific program covered all parasitology themes from Veterinary Parasitology to Human Parasitology, with Anaerobic Protists, Malaria, Bioinformatics, Microscopy, Livestock, Wildlife Parasitology, Fish Parasitology, Companion Animals and One Health. Invited Speakers;

- **Professor Carmen Faso**, University of Bern, Switzerland, Plenary Speaker, Elsevier Plenary Lecture Series, International Journal for Parasitology (IJP) Invited Lecturer
- **Dr Ralph Vanstreels**, Institute of Research and Rehabilitation of Marine Animals, Espírito Santo, Brazil, and University of California, Davis, Plenary Speaker, Elsevier Plenary Lecture Series, IJP: Parasites and Wildlife (IJP:PAW) Invited Lecturer
- **Dr Petra Matoušková**, Charles University, Prague, Elsevier Plenary Lecture Series, IJP: Drugs and Drug Resistance (IJP:DDR) Invited Lecturer
- **Prof Upinder Singh**, Stanford University, USA, Plenary Lecturer for the 7th International Conference on Anaerobic Protists
- **Professor Raina Fichorova**, Professor of Obstetrics, Gynecology and Reproductive Biology, Harvard Medical School, Plenary Lecturer for the 7th International Conference on Anaerobic Protists
- **Professor John Gilleard**, Faculty of Veterinary Medicine, University of Calgary, Canada, Plenary Lecturer for the NZSP sponsored by Beef + Lamb New Zealand Ltd
- **Professor Jake Baum**, UNSW, our 2024 Bancroft-Mackerras Medal for Excellence Winner
- **Dr Melanie Ridgway,** John Frederick Adrian Sprent Prize 2023 winner
- **Professor Alex Maier,** Bridget Ogilvie Medal 2024 winner

On the first full day of the Parasites in the Pacific 2024 Conference we started with a networking breakfast event for our research students and early career researchers.

Professor Katherine Andrews from Griffith University ran this ECR event "Creating impact narratives for CVs and beyond" as an interactive workshop. The wonderful mentors who took part in the Student and ECR Breakfast event were:

Professor Kathy Andrews, Director, Griffith Institute for Drug Discovery, Head, Tropical Parasitology Lab, Griffith Institute for Drug Discovery and Professor, School of Environment and Science – Bioscience, Griffith University
Professor Carmen Faso, University of Bern, Switzerland
Dr Ralph Vanstreels, Institute of Research and Rehabilitation of Marine Animals, Espírito Santo, Brazil, and University of California, Davis
Prof Upinder Singh, Stanford University, USA
Dr Petra Matoušková, Associate Professor, Department of Biochemical Sciences, Faculty of Pharmacy, Charles University,

Group Leader – Research Group of Xenobiotic resistance mechanisms, Charles University, Prague
Dr Stephanie S. Godfrey, University of Otago
Professor Jake Baum, Head of School of Medical Sciences at UNSW, Sydney
Dr Danny Wilson, Research Fellow, Group Leader, Malaria and Parasite Biology Lab School of Biological Sciences, Faculty of Sciences, Engineering and Technology, The University of Adelaide
Professor Stuart Ralph, Head of Department, Biochemistry and Pharmacology, University of Melbourne
Professor Alex Maier, Group Leader, Maier Group - Molecular mechanisms of malaria pathogenesis, Australian National University
Dr Vito Colella, Senior Lecturer & Research Fellow (One Health), Veterinary Biosciences, Faculty of Science, University of Melbourne

Check out the conference social media posts #PiP2024

Parents or carers with children were able to watch and listen to the conference presentations live online during the conference in a room separate from the lecture theatres. A multi-faith prayer room was available during the conference. Delegates unable to attend due to illness (like COVID-19) were able to watch the conference sessions live-streamed.

The Parasites in the Pacific 2024 Conference embraced the values of inclusiveness, social justice, environmental sustainability, scientific advancement, and education within the broader life science community. See our policy documents and code of conduct on the Conference website https://www.parasite.org.au/aspconference/advice/policy/

2024 ASP Student Conference Funding Scheme supported 48 ASP student members to attend Parasites in the Pacific

Parasites in the Pacific 2024 Conference

2024, with a total funding of $42402.

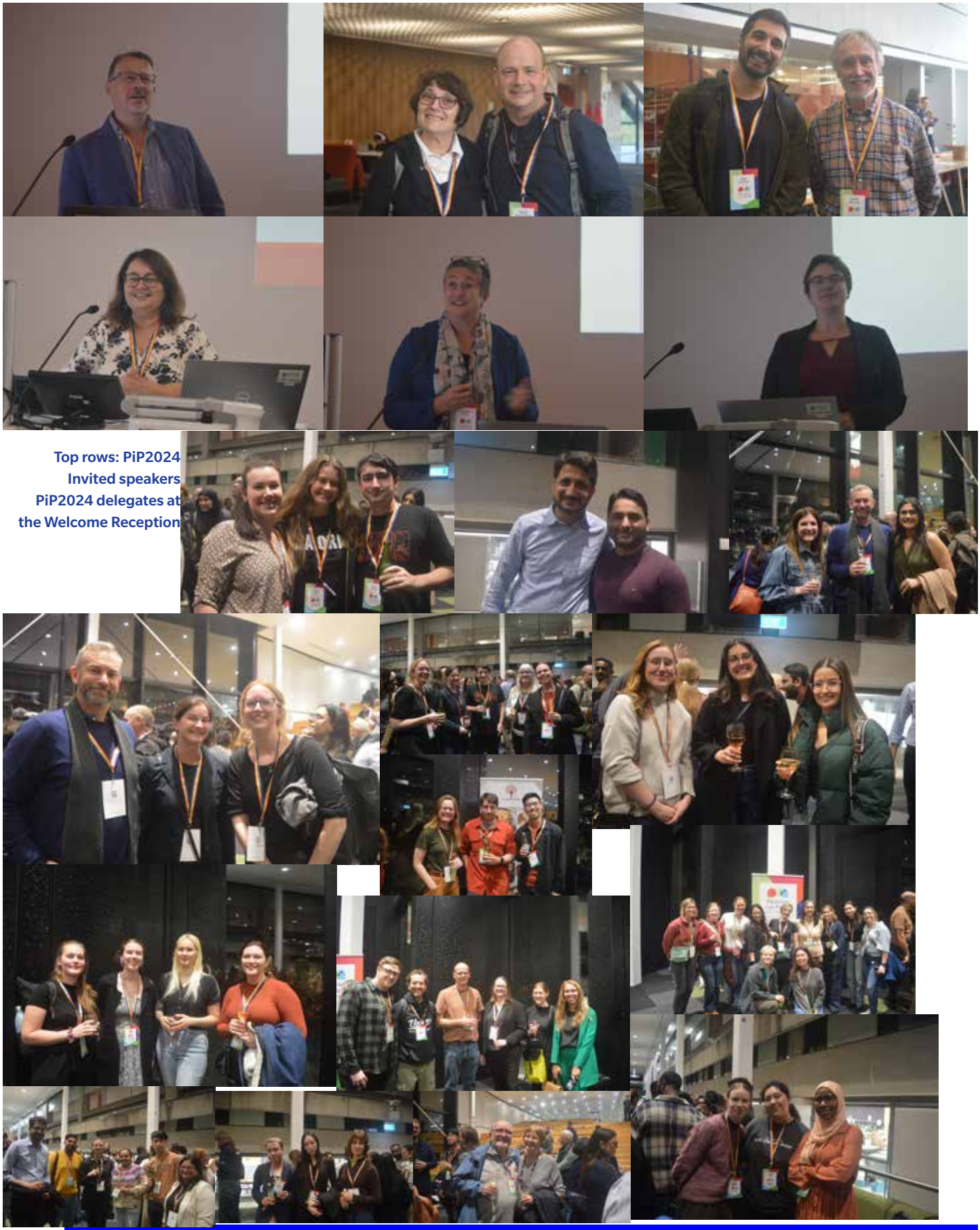
Thanks to the Conference Chair, A**ugusto Simoes-Barbosa**, University of Auckland the Conference Scientific Committee **Kathryn McRae** (AgResearch NZ & NZSP President); **Danny Wilson** (University of Adelaide & ASP President); **Stephanie Godfrey** (University of Otago); **Una Ryan** (Murdoch University); **Carmen Faso** (University of Bern); **Upinder Singh** (Stanford University) and **Nick Smith** (Australian Society for Parasitology) and the Conference Volunteers **Connor McHugh** (James Cook University); **Maxine Smith** (James Cook University); **Ashton Kelly** (University of Queensland); B**ailey Dickson** (University of Auckland); **Khatima Mohammadi** (University of Auckland); **Saulo Menezes** (University of Auckland); **Jiahao Xu** (University of Auckland); **Daniel Toledo** (University of Auckland); **Bridget Lamont** (University of Otago); **Zoe Brown** (University of Otago); **Emma Scheltema** (Massey University); **Katie Buschang** (University of Otago); and **Xuhong Chai** (University of Otago) who all gave their valuable time to help make this conference run brilliantly! **Lisa Jones** was the Conference coordinator.

We would, once again, like to acknowledge the generous support of our Parasites in the Pacific 2024 Conference sponsors, thanks to **Elsevier Parasitology and the International Journal for Parasitology (IJP), IJP DDR and IJP PAW, Beef + Lamb New Zealand Ltd, Elanco, New England Biolabs, eLife, Tourism New Zealand, Tātaki Auckland Unlimited, MDPI, Pathogens, and Parasitologia, Auckland Medical Research Foundation and Maurice and Phyllis Paykel Trust.**

Next years ASP Annual Conference will take place from the evening of Monday 30th June - Thursday 3rd July 2025 at Melbourne Connect, Melbourne Victoria. More details coming soon!

Top: amazing volunteer team at PiP2024 NZSP team (Kathryn McRae, Tania Waghorn and Augustus Simoes-Barbosa) at PiP2024 ASP Executive Hayley, Ghizal, Aaron and Danny with Nick and ASP prize winners Alex, Melanie, Jake and Pengfei (Elsevier)

Parasites in the Pacific 2024 Conference

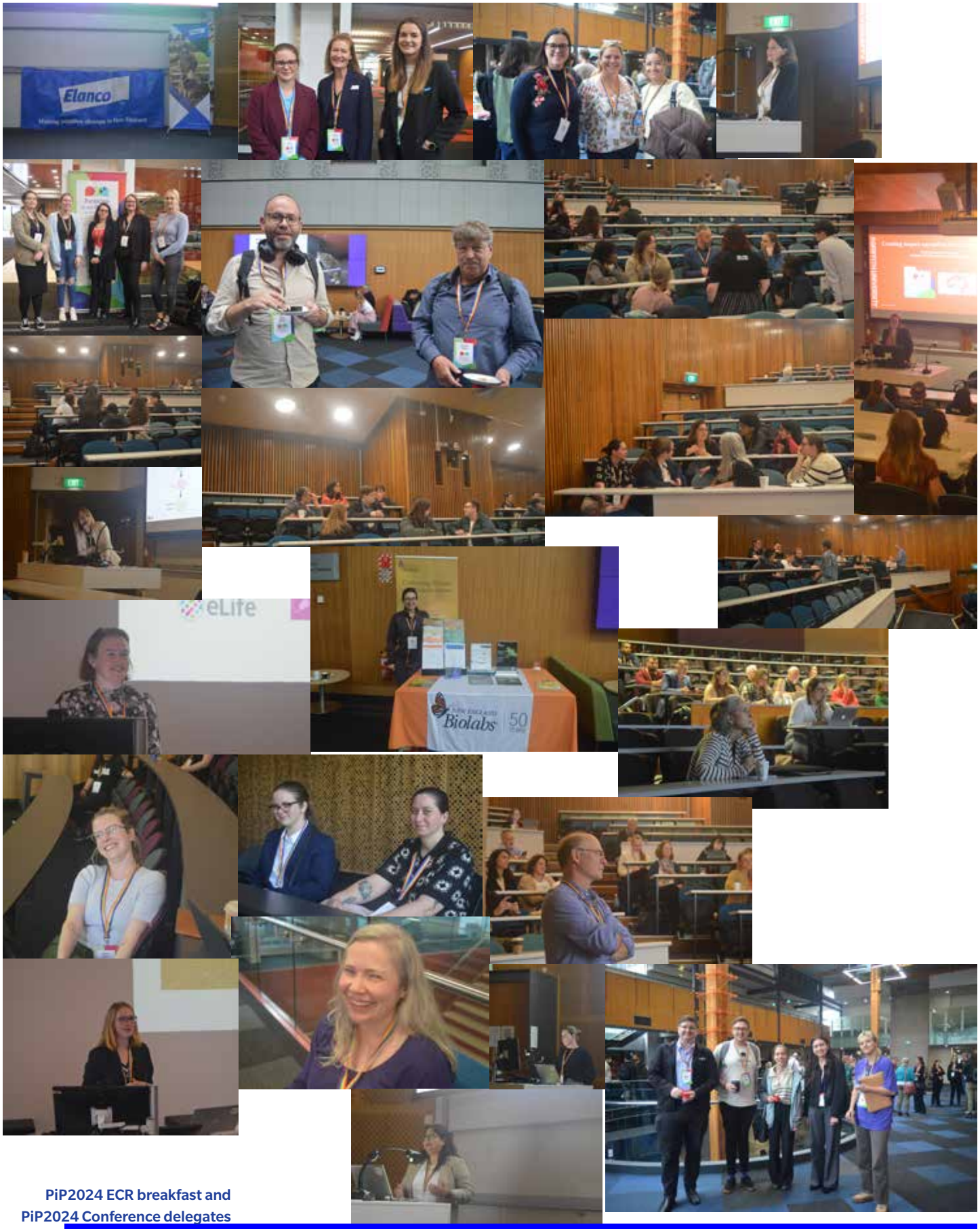


Top rows: PiP2024 Invited speakers
PiP2024 delegates at the Welcome Reception

Parasites in the Pacific 2024 Conference

PiP2024 Conference delegates and at the Welcome Reception

Parasites in the Pacific 2024 Conference



PiP2024 ECR breakfast and PiP2024 Conference delegates

Parasites in the Pacific 2024 Conference

NZSP prize winner, ICAP prize winners and PiP2024 Conference delegates

Parasites in the Pacific 2024 Conference

PiP2024 Conference dinner

Parasite Outreach at Auckland Zoo

Auckland Zoo visitors explored the fascinating world of parasites with hands-on science activities for everyone to enjoy, and an opportunity for zoo patrons to get "under the skin" of New Zealand and Australia's parasitologists.

Auckland Zoo hosted us on Saturday 24th August for a Parasites in the Pacific Outreach event by the Australian and New Zealand Societies for Parasitology. Approximately 200 visitors joined us on the day and most stayed for 20 minutes or more to enjoy all of the outreah activities.

We set up at the Vet Hospital viewing gallery at the Auckland Zoo with help from the following awesome volunteers: Nick Smith, Augusto Simoes-Barbosa, Connor McHugh, Maxine Smith, Rina Fu, Sarah Preston, Rebecca Farnell and Tanya King.

Visitors were encouraged to join us for for an adventure through the fascinating world of parasites with hands-on science activities for everyone, and an opportunity for zoo patrons to get "under the skin" of New Zealand and Australia's parasitologists.

Visitors explored the science of parasites, made their own parasite mask or pet parasite out of clay to take home.

Visitors were able to experience parasites - up close and personal through virtual reality games throughout the day.

Our young parasitologists joined Rina Fu for parasites book reading and parasite sing song throughout the day.

Report by Lisa Jones

Above: Images from Auckland Zoo Parasite Outreach event

ASP Parasite Podcast: What's eating you?

Welcome to What's eating you? the Parasite Podcast for the Australian Society for Parasitology.

"What's eating you?" ASP Parasite Podcast presenters (L-R) Alexandra Hudson, Sarah Preston and Lisa Jones with guest speaker Vern Bowles (below)

We are very excited to launch our ASP Podcast, "What's eating you? the Parasite Podcast for the Australian Society for Parasitology". Join hosts Dr Sarah Preston from Federation University Australia (parasitic worm enthusiast who trains students on parasites, how they can cause disease and how to control infections), Lisa Jones, from the ASP and visiting comedian, the amazing Alexandra Hudson! Alexandra Hudson made her comedy debut in July 2020. In 2022 Alexandra was the national winner at the Raw Competition at the Melbourne International Comedy Festival and has just returned from the UK where she made her 2024 Edinburgh Festival Fringe debut.

Our "What's eating you?" team will question, quiz, and grill our expert parasitologists from the ASP.

Is it headlice, making your head itch? Or *cryptosporidium* giving you a dodgy tummy? And was that a feral pig you noticed when hiking last weekend? Why do you take malaria medication as a preventative measure before travelling to some countries? Are their soil transmitted parasites in Australia? Can you really be eaten alive by bed bugs?

Join us on our funny, informative, and always serious about science Parasite Podcast "What's eating you?". Releasing episodes once a month, at where ever you listen to your podcasts! **Launching in November 2024**

https://www.parasite.org.au/education/whats-eating-you-podcast/

Episode 1.

What's eating you?

Headlice!

Episode 1 of ASP Parasite Podcast: *What's eating you?* is all about those tiny itchy and scratchy insects we all love to hate "Headlice".

Our expert parasitologist is Associate Professor Vern Bowles from The University of Melbourne. Vern has studied parasites that live outside of the body also known as ectoparasites for most of his science career such as the sheep blowfly and the dreaded head lice. Vern worked on this for over 15 years, set up a company and developed a new treatment for head lice targeting different life stages.

For this story, Vern will give us his expert opinion about the ectoparasites head lice.

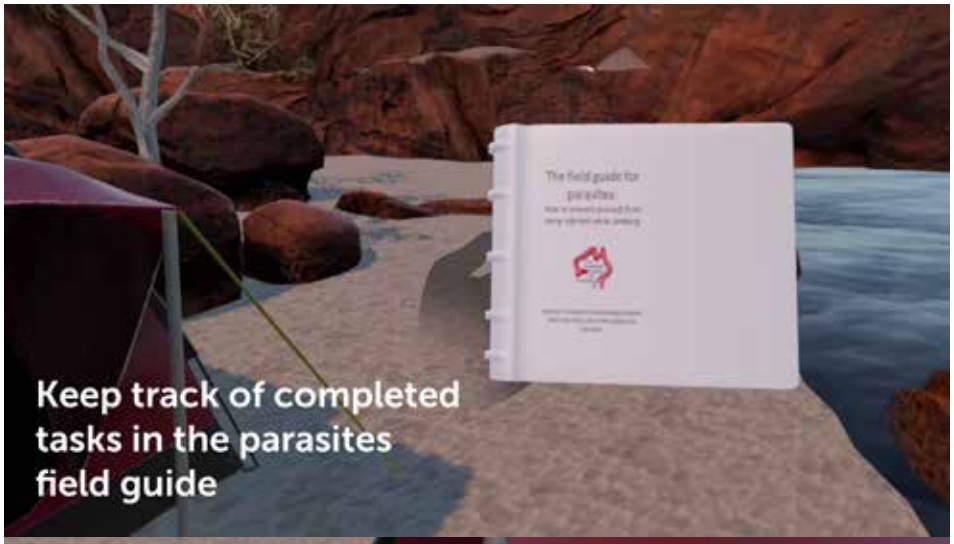
Parasite Camping VR

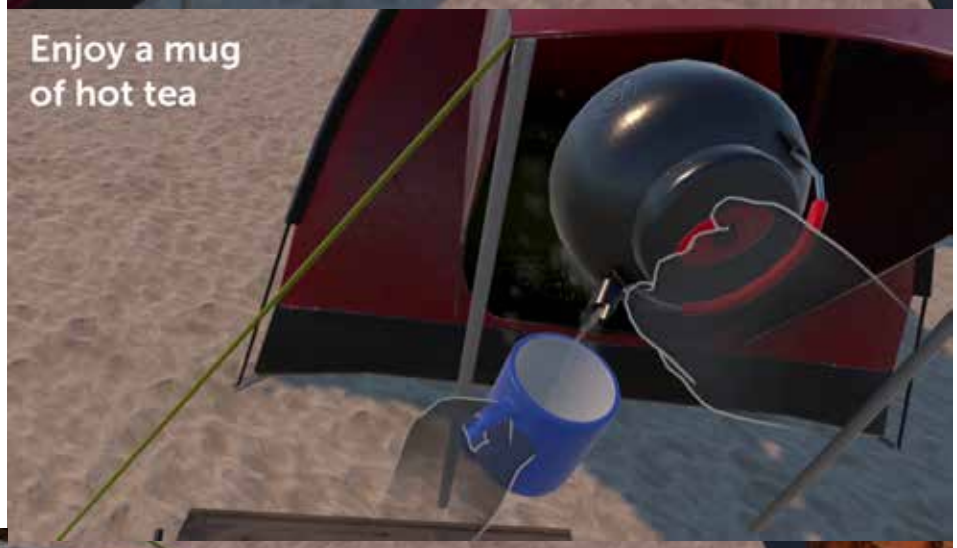
We are excited to share our latest Virtual Reality Experience for Parasite Education and Outreach. This game "Parasite Camping VR" was designed by students that attended the ASP's Concepts in Parasitology Course in 2023 and 2022 and its development by Federation University was funded by the ASP through the Education Committee. The game explores the One Health approach to parasite control highlighting that prevention is better than a cure. If you have a MetaQuest headset, have a go (it's Free!) and let us know what you think. We are also looking for parasite images that we can use for the Parasite Field guide used in the game, so if you have images that you are happy for us to use, let us know. Rmail secretary@parasite.org.au

https://www.meta.com/en-gb/experiences/6963613940388408

Other VR experiences that we have designed for veterinary education/outreach are below.

https://www.meta.com/en-gb/experiences/3656748804421439/





"Parasite Camping VR" images from the game

Malaria in Queensland Symposium

ASP members A/Prof Danielle Stanisic (Griffith University) and Dr Carla Proietti (University of Queensland), co-chaired the Malaria in Queensland research symposium along with Professor Denise Doolan (University of Queensland), at the Institute for Molecular Biosciences, University of Queensland, 30th April 2024. This event won ASP State Outreach funding.

This is a report for the event Malaria in Queensland research symposium which took place 30th April 2024.

The target audience for this event were research staff and students working in the field of malaria research in QLD. There were 50 registrants (45 attendees) for the event, and this included staff and students from UQ, QIMR Berghofer, ADFMIDI, University of Sunshine Coast, Griffith University and the Burnet Institute. The symposium had 11 speakers (12 were scheduled but 1 was absent due to illness) who presented on vaccines, immunology, diagnostics and drug discovery. There were also a number of posters displayed for discussion during the breaks.

We received very good feedback from attendees of this meeting. It was discussed in the final session that going forward, we would aim to hold this as an annual meeting and rotate the venue between the different research organisations where malaria research is undertaken. By advertising earlier, we hope to increase the number of attendees next year.

As the venue was provided free of charge by the University of QLD, the ASP State Outreach funds were used to provide lunch and refreshments for the attendees during the day. This was much appreciated by the conference attendees and organisers.

The event was advertised at the MAM2024 conference, by ASP in their newsletter, on social media and via email to malaria researchers based in QLD.

Part of ASP's focus is to enhance Australia's parasitology research capabilities to enable a better understanding of parasites and to apply this knowledge to develop sustainable control strategies to improve the health and wellbeing of humans. Research symposiums that enable sharing and discussion of research findings and ideas facilitate this. During the speaker sessions, breaks and the optional conference dinner, there was much discussion of the research being presented. Additionally, a number of research collaborations were initiated on that day opportunities to contribute to grant applications that were being prepared/proposed were discussed. There was discussion in the final session (led by Professor Denise Doolan) of strategies for joint grant applications and this will be followed up going forward.

Attendees at the 2024 Malaria in Queensland research symposium.

Tasmania State Outreach event Beaker Street Science Festival

Tasmania State Rep Kate Hutson joined the Beaker Street Science Festival in Hobart (Festival - Beaker Street), Tasmania with support from the Australian Society for Parasitology: see Kate Hutson - Beaker Street. As a "Roving Scientist" she joined hundreds of other scientists that go to the festival each year, filling up pubs and chatting to complete strangers as part of Beaker Street Festival. Like speed-dating for scientists, the initiative gives the public an opportunity to meet scientists and talk about science. Kate borrowed a variety of interesting parasites from the University of Tasmania Department of Zoology collection – including cestodes from Tasmanian devils, ticks attached to snakeskin and live mites on the body of a bumblebee which made her table particularly popular with the public! This event provided an excellent platform for international community outreach as well as extending the ASP's science network.

Kate Hutson at the Beaker Street Science Festival in Hobart (Festival - Beaker Street)

Tasmanian and Antarctic One Health Conference

Registrations and abstracts are now open for the Tasmanian and Antarctic One Health conference 2024 – we have already had over 50 registrations! The conference will be held on Monday 25th of November at the Aurora Lecture Theatre at the Institute for Marine and Antarctic Studies, The University of Tasmania, Battery Point. This is the third Tasmanian One Health conference and this year we are extending it to include talks with an Antarctic focus.

To register, contact Nick Fountain-Jones (nick.fountainjones@utas.edu.au) with the name/affiliation you want to have on your name badge and if you have any food intolerances. Conference registration is free and catering will be provided to the people who have registered. Special thanks to the Australian Society for Parasitology and the Antarctic and Southern Ocean Mission Integrator for funding.

If you are interested in a talk, let us know in the email as well. We'll have longer talks (~15 mins) as well as 5 or 2 minute speed talk slots open (to be confirmed). One purpose of the talks is to help further our One Health conversations but doesn't have to be specifically about One Health.

Feel free to spread the word through your own networks.

Outreach activities in Western Australia

Let's find out what our fabulous outreach extraordinaire ASP member Dr Rina Fu has been up to in Western Australia!

Photos: Dr Rina with students at TechTrails at Woodlands Primary School

The TechTrails STEM and Future Skills Woodlands Primary School

The TechTrails STEM and Future Skills Incursion program was hosted by Women in Technology WA (WITWA) that "provides insights into a diverse range of careers across technology and STEM through showcasing amazing female role models who share their own career journeys". Rina was one of five invited presenters; [S. McCue Aircraft Maintenance Qantas, B. Orugun Engineer TechnipFMC, R Beardsley Business & Mining, M. Sandford AI Developer Microsoft and R. Wong, Author, Artist & Scientist].

Rina ran 4 interactive sessions engaging 10- and 11 year-olds using personal stories about her journey from a girl to a scientist, malaria research in song, parasites in her storybook, microscopy and designing their own parasites. Rina designed a worksheet that gets students to think about whether their unique creature would be an 'exo' or 'endo' parasite, that might target a human or animal host (or both), the route of infection and relate the structural design to function (e.g. whippy tail for mobility or claws and suckers to cling onto body tissues).

The Australian Society for Parasitology was acknowledged in all four sessions to students and their teachers, as well as the WITWA host. Rina also embedded 'ASP's Crafty Parasites' in her talk and personally recommended this to teachers as a curriculum-linked STEAM resource, with many interested in visiting the ASP website. Rina used the ASP outreach funds towards full colour photocopying of the 'Design Your Parasites' worksheets, models and clay. The event was promoted by WITWA's STEM network, LinkedIn & social media. I believe this outreach was a great success in achieving ASP's goals to inspire the next generation about a career studying parasites, dispel the general disgust about parasites, gain an appreciation of the parasite burden on a global scale and foster an interest in parasitology.

Rina Fu.

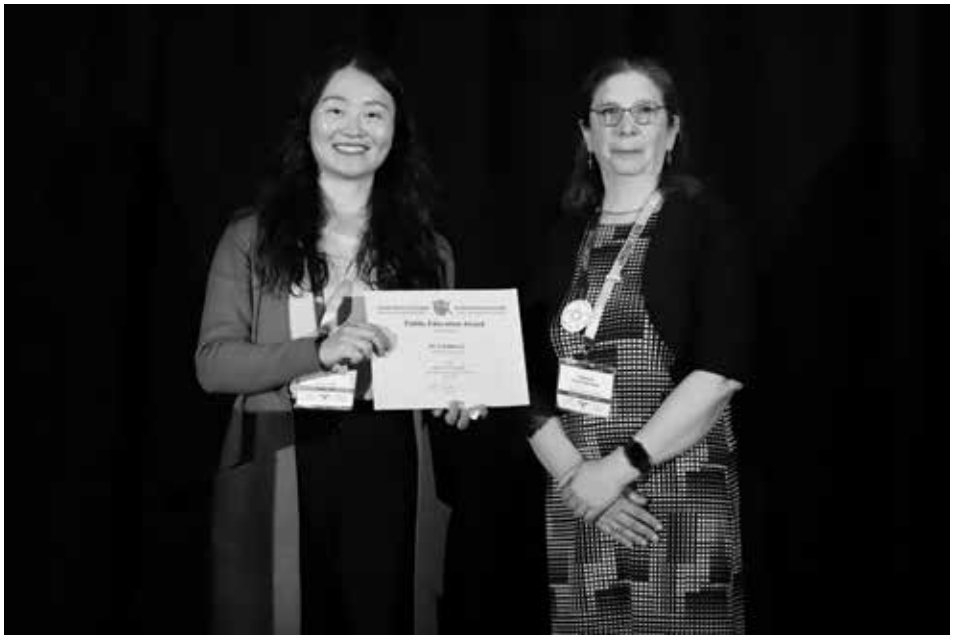
Outreach activities in Western Australia cont...

Images courtesy Rina Fu of Tech Trails at Woodlands Primary school. (L-R from top) DYO parasites out of clay; Speakers at Tech Trails; Student participants at Tech Trails with Dr Rina and the Tech Trails Woodlands booklet

CiP Alumni Corner

Welcome to our very first "CiP Alumni Corner" interview and profile. 2019 CiP alumni, Chenhua Li, tells us about her key highlights since CiP, the recent success with parasitology outreach, and how CiP inspired and motivated her.

Congratulations to Chenhua Li who won the Canadian Society of Zoologists Public Education Award for her exceptional contributions to public education in the field of parasitology. https://www.ucalgary.ca/news/vet-med-alum-recognized-excellence-public-education-parasites



Chenhua Li who won the Canadian Society of Zoologists Public Education Award for her exceptional contributions to public education in the field of parasitology.

1. Chenhua tell us more about your background, what lead you to become a parasitologist?

I grew up and completed my BSc in Xi'an, China. Then, I came to Canada for my graduate studies. My MSc supervisor, Dr. Jillian Detwiler, introduced me to the world of parasitology passionately through my MSc study at the University of Manitoba. I was amazed by the parasitic manipulation – something so small can change the behavior or morphology of their hosts that are tens to thousands of times bigger! That led to me pursuing my PhD working with Dicrocoelium dendriticum infected zombie ants in Alberta, Cananda.

What led me to become a parasitologist was mainly my curiosity about these fascinating creatures. I also gained lots of inspiration and motivation from other parasitologist's passion.

2. You represent complicated science concepts through art, tell us about this, what inspired you to use art to communicate science and how successful has it been?

I think language sometimes can cause barriers for understanding (e.g., scientific jargons, accent, non-native speakers, etc.), but art has always been a universal messenger. We can always appreciate van Gogh's The Starry Night, The Great Wave by Hokusai, and many more, no matter the language we speak. When it comes to delivering complicated concepts in science, good visuals that are not only scientifically accurate but also appealing would attract people's attention and help convey the idea. At the beginning of my PhD, I started to work with my artist friend Xiao Xiao to draw complex life cycles of various parasites to improve communication effectiveness to the audience.

In 2021 I founded the Global Parasitologist Coalition with a mission to amplify the field of parasitology, and to inspire future researchers and students. With the challenges of the pandemic that year, we leveraged digital platforms during the Parasite Biodiversity Day event. Our efforts included creating seven unique abstract artworks as our posters for the sessions and producing "Who? Parasitologist?", an interview closely curated by both our artist and scientists. The event gained more than 1100 live views with audience from 93 different countries. The interview has been used as parasitology course material at the University of Lethbridge and sparked a dialogue at Oklahoma State University about integrating parasitology into high school curricula.

In 2022, we designed and launched the Parasite Personality Quiz. Our parasitologists designed the questions to guide people from the journey of a dream vacation. With the 13 possible personality results, we creatively matched a parasite to each of the personality with a description of how that parasite represents the personality. Our artists complemented each parasite personality result with unique designs. In 2023, we designed stickers for the results, and turned them into augmented reality filters on our Instagram, to show people how each parasite moves. The quiz has reached over 5000 participants to date with positive feedback.

Through these endeavors, I've witnessed firsthand the power of art to transcend

CiP Alumni Corner cont...

Chenhua Li and colleagues conducting outreach activities as part of the Global Parasitologist Coalition (above) and products available (below).

language and geographic barriers and engage diverse audiences in scientific discourse. It's immensely rewarding to see people not only enjoying the art but also gaining insights into the fascinating world of parasites.

3. Chenhua, can you tell us more about your career as an academic and do you have any advice for our ASP members who are early career researchers, or just starting their PhD?

After completing my BSc in China at the Northwest A&F University, I came to Canada for my graduate studies. During my MSc at the University of Manitoba, I studied parasites in muskrats and freshwater snails. I got interested in parasitic manipulation, and then I came to Calgary for my PhD to study Dicrocoelium dendriticum-infected ants, also known as the zombie ants. I'm currently looking for post-doc positions in parasite ecology and host-parasite interactions.

As for advice, I don't know how much I can offer as I am also at the early stage of my career. If people have advice for me, I would love to hear it! If I could travel back in time and meet my younger self starting my PhD, I would say, **"Be brave and creative, keep nurturing your passion, and don't hesitate to collaborate with your colleagues to initiate projects."**

4. In 2019 you attended the ASP Concepts in Parasitology (CiP) course at ANU Kioloa Costal Campus, NSW. Tell us about the course, and how did it help your parasitology career?

It was a great experience! It was my first time in Australia, and I got the whole kangaroo experience during the course! From watching them hopping around, tasting the meat, collecting their poop for nematode investigation, all the way to dissecting a wallaby! 2019 CIP was the year we were emergently evacuated from the bush fire from the Kioloa campus. Even that, the CIP organizing team managed to evacuate us to a motel, and had the fish parasite sessions in the motel!

I also met many fellow researchers and students during the course. For example, Dr. Thorey Jonsdottir, who I met in the CIP course, is now our collaborator on a series of parasite comics with the Global Parasitologist Coalition. Dr. Michelle Power, who I met in the CIP course, collaborated with us on the 2021 Parasite Biodiversity Day event as a speaker in the "Parasite and host animals with pouches" session.

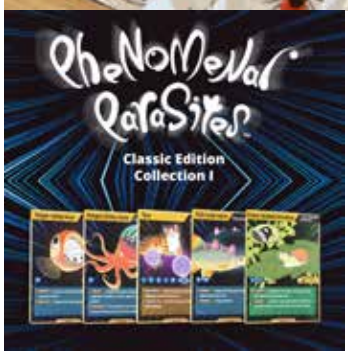
Besides the connections I made during the course, I also appreciate the broad scope of the course and many hands-on skills the course provided me with. For example, I did my very first scanning electron microscopy during the course. And the very first engorged tick I dissected was also in the CIP course.

5. Where do you see your future parasitology career?

I'm still trying to figure it out. I really enjoy doing parasite research and having hands-on experience working with parasites. I would want to see myself become a parasitology researcher. If lucky enough, maybe a professor someday.

Thanks so much Chenhua Li we can't wait to see what's next in your art-science parasitology career!

If you are interested in the parasite cards, individual cards can be seen on our website - https://www.globalpc.org/product-page/phenomenal-parasites-classic-edition-collection-i. Previous comics can also be found here - https://www.globalpc.org/parasitecomics. The parasite personality quiz can be found here - https://www.globalpc.org/, and one of the attached images is the stickers we made for the results.



ECRs in the Spotlight: Jill Chmielewski, co-chair of the ASP Seminar Series

ASP member Dr Jill Chmielewski, Walter and Eliza Hall Institute, is one of the co-chairs of the ASP Online Seminar Series and we are featuring Jill as one of our ASP "ECRs in the Spotlight".

Jill Chmielewski

Welcome Jill! As well as co-chairing the ASP Seminar Series you were the ASP Student Representative (July 2022- August 2024). Taking on volunteer leadership positions can be challenging to balance with a full research career, how do you balance the two and what are the rewards of volunteering your time?

It can certainly be challenging to balance your everyday work, with "extra curricula"/ volunteer work as well as maintaining your overall goals and a good work/life balance. I try to achieve balance by keeping to a diary and forward planning as much as I can.

Volunteering for these positions has been rewarding because it allows me to step outside my typical day to day and be exposed to new situations, environments, and skills. To me, the ASP meetings or seminars almost feel like a mini holiday or brain reset. Also, it's been great getting to know the other ASP representatives and members.

Jill, you are a recently graduated PhD student and have joined the Walter and Eliza Hall Institute. Please tell us about your research, both from your PhD and in your current role at WEHI.

My PhD and current work are focused on the malaria parasite. During my PhD at the University of Adelaide, I used in vitro culture systems as well as gene editing to study two species; *Plasmodium falciparum* and *P. knowlesi* (a zoonotic species). Specifically, I was aiming to better understand the function and immunogenicity of merozoite surface proteins which, because of their surface localisation, may be used by the parasite to invade red blood cells (in which they replicate asexually and cause the clinical symptoms) or could be important immunological targets.

At WEHI, I'm utilizing some of my existing skills in parasite culture and genetic modifications to study the sexual stages of *P. falciparum*. Sexual replication occurs in mosquitos and starts with gamete activation and fusion. We're hoping to better understand the mechanisms of gamete fusion and in turn identify key molecular interactions that can be disrupted to contribute towards preventing malaria transmission and hence disease.

What lead you to become a malaria researcher and what continues to inspire you?

I studied science because I felt it was a good Venn diagram overlap of my intrinsic skills, hopeful benefit to society, and achieving a sense of satisfaction at the end of the workday. My PhD in malaria was really a result of our current ASP president, my supervisor, Dr Danny Wilson. I did a placement in his lab and found it to be a supportive and inspiring environment, so I stuck with it.

My persistence with this field is a result such a positive PhD experience, as well as the broader scientific malaria community, how interesting the research is, the challenge of it, as well as how unjust it is that a preventable disease is still killing so many kids.

What is the benefit of having good mentorship during your scientific career?

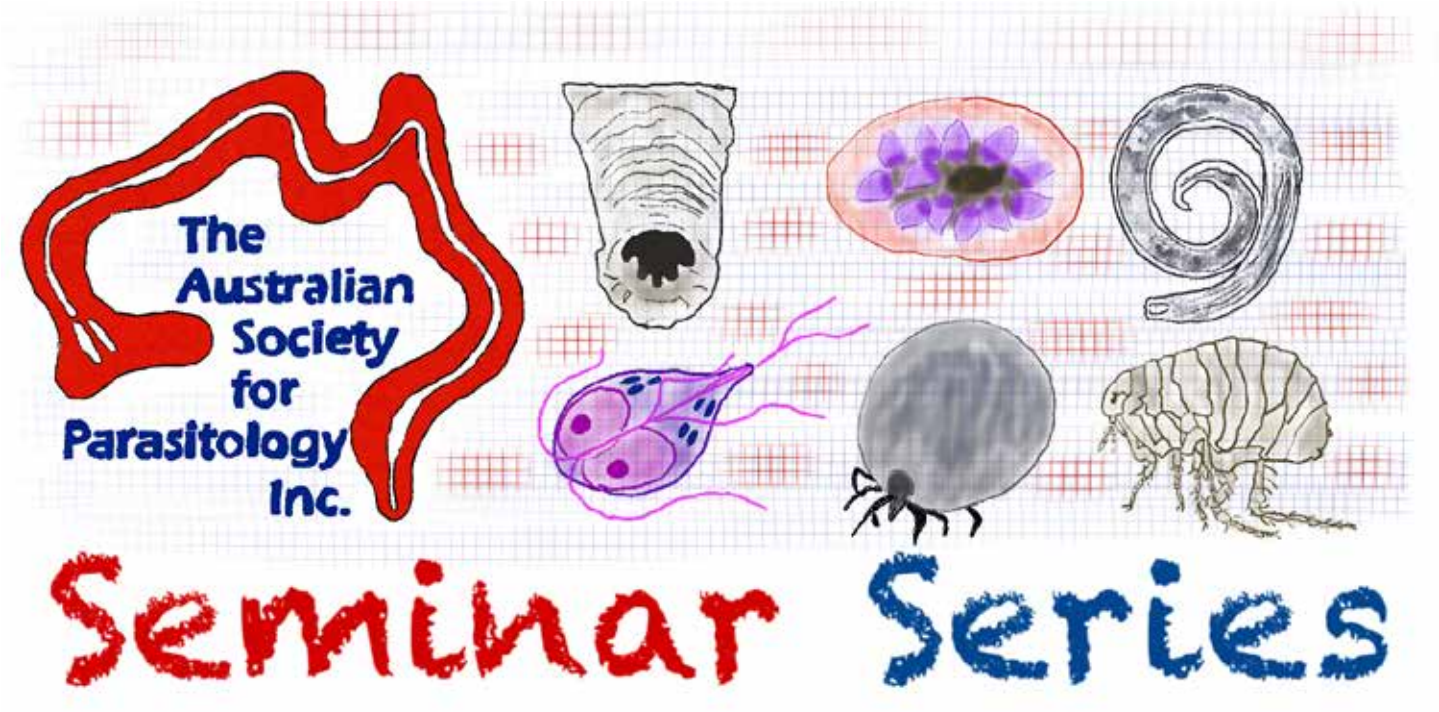
Some people have an inherent confidence in becoming a scientific researcher, despite how competitive it is and imposture syndrome amongst other difficulties. I don't have that inherent confidence, so it can seem daunting sometimes. I think receiving good mentorship is key to demystifying it all and better understanding your options. A good mentor can also be a major source of inspiration.

Do you have any advice for our ASP members who are early career researchers, or writing up their PhD?

Get involved in things. Collaborations, networking opportunities, workshops. I find you always get something out of it, even if it's something small, it all adds up.

Thanks so much Jill!

ASP Seminar Series



Join our next ASP Online Seminar on Friday November 15th @ 4pm AEDT featuring Elise Ringwaldt, University of Tasmania presenting "The epidemiology of rumpwear in common brushtail possums: insights from visual clinical signs, camera trapping, and machine-learning." and Long Huynh, The University of Melbourne presenting "Cytostome formation in artemisinin resistant *Plasmodium* parasites" with co-chairs Jill Chmielewski, Walter and Eliza Hall Institute and Emma McHugh, University of Melbourne.

https://www.parasite.org.au/blog/asp-online-seminar-series-15th-november-2024-4pm-aedt/

Join our next online ASP Seminar Series Friday 15th November 2024, **at the new time of 4pm AEDT,** featuring Elise Ringwaldt, University of Tasmania presenting "The epidemiology of rumpwear in common brushtail possums: insights from visual clinical signs, camera trapping, and machine-learning" and Long Huynh, The University of Melbourne presenting "Cytostome formation in artemisinin resistant Plasmodium parasites" with co-chairs Jill Chmielewski, Walter and Eliza Hall Institute and Emma McHugh, University of Melbourne.
Please register online using this link for your unique passcode to join the seminar. After registering, you will receive a confirmation email containing information about joining the meeting.

Dr Elise Ringwaldt is a Postdoctoral Researcher at the University of Tasmania. She is currently investigating the landscape epidemiology of sarcoptic mange in bare-nosed wombats in New South Wales as part of the Curb Wombat Mange Project, supervised by Prof. Scott Carver, funded by the New South Wales Department of Environment and Planning. Elise completed her PhD at the University of Tasmania last year, where she focused on how visually apparent diseases in wildlife offer opportunities to study landscape epidemiology, especially when combined with remote-surveillance technology, such as camera trapping. Her thesis used Tasmanian wildlife and their visual disease as case studies, including wombats with sarcoptic mange and possums with rumpwear. Her broader research interests include disease ecology, landscape epidemiology, wildlife conservation, parasitology, and animal health. Elise is also a keen fieldworker and finds any excuse to be outside collecting the data. She is also currently a field technician at the Royal Veterinary College, University of London, collecting data for rodent virome research.

Talk Title: "The epidemiology of rumpwear in common brushtail possums: insights from visual clinical signs, camera trapping, and machine-learning."
Ringwaldt, E.M., Buettel, J.C., Carver, S., & Brook, B.W
Abstract: Visually apparent diseases are valuable for investigating and monitoring the occurrence and prevalence of pathogens in wildlife populations, particularly through passive monitoring methods like camera trapping. Rumpwear, characterized by visible clinical signs of hair breakage and damage on the lumbosacral region, affects common brushtail possums (Trichosurus vulpecula) across Australia. However, the etiology of

ASP Seminar Series continued



Our seminar speakers (from L-R) Elise Ringwaldt, University of Tasmania, Long Huynh, The University of Melbourne and Arkasha Sadhewa, Menzies School of Health Research and Charles Darwin University,

rumpwear remains unclear (hypothesised to be an ectoparasite), and the spatiotemporal factors are understudied. This study investigated the epidemiology of rumpwear in common brushtail possums at Adamsfield, Tasmania (Australia), and predicted rumpwear distribution across the Tasmanian landscape. We visually classified images of rumpwear clinical signs in 6,908 individual possums collected from a three-year camera trapping network. Our results revealed that: (1) adults were twice as likely to show signs of rumpwear compared to young possums; (2) rumpwear occurrence increased with the relative activity of possums at a site; and (3) prevalence of rumpwear was seasonal, being lowest in May (3.2% - late autumn) and highest in December (27.1% - early summer). Collectively, these findings suggest that the occurrence of rumpwear may be density dependent, the putative etiological agent seems to be influenced by seasonal factors or site use. Additionally, a convolution neural network (CNN) was trained to identify rumpwear automatically based on the manually (human-expert) classified camera trap images. Applying the trained classifier to 38,589 brushtail possum images from across Tasmania, the CNN predicted that rumpwear is widespread, with an overall prevalence of 18.6%. This study provides new insights into the epidemiology of rumpwear, identifies factors for further investigation within this host-pathogen system, and demonstrates how passive surveillance, combined with CNN models, can enhance broader wildlife health monitoring and management.

Long Huynh completed an Honours project under the supervision of Prof. Stuart Ralph at the University of Melbourne, investigating the role of the P. falciparum apicoplast in constructing glycophosphatidylinositol (GPI) anchors and their subsequent roles in egress and invasion. He has continued on with a PhD project in Prof. Stuart Ralph's lab investigating how mutations in the P. falciparum K13 protein confers resistance to artemisinin, a key frontline antimalarial. Long is utilising techniques such as expansion microscopy, super-resolution microscopy and cryo-electron tomography to elucidate phenotypic differences in K13 mutant parasites.

Talk title: "Cytostome formation in artemisinin resistant Plasmodium parasites"
Long K Huynh, Stuart Ralph, Department of Biochemistry and Pharmacology, University of Melbourne, Melbourne, VIC, Australia
Abstract: Resistance against the frontline antimalarial, artemisinin, is predominantly driven by mutations in the Kelch 13 (K13) protein. K13 plays a crucial role in the formation of a double-membraned invagination termed the cytostome; the apparatus which facilitates the uptake of haemoglobin from the host red blood cell into the Plasmodium parasite. As the parasite progresses through its asexual life cycle, it forms new cytostomes to increase the rate of haemoglobin uptake. Haemoglobin digestion supplies essential amino acids and creates space within the red blood cell to facilitate parasite growth, while also releasing haem-iron as a waste byproduct which is required for the activation of artemisinin. Parasites harbouring K13 mutations exhibit a slower feeding rate, characterised by a reduction in haem biosynthesis and delayed growth. Consequently, this reduced level of haem leads to less artemisinin activation, resulting in less parasite death. However, the exact mechanism by which K13 mutations result in impaired parasite feeding remains unclear.

We propose that mutation of K13 reduces its stability and abundance, impacting the formation and maintenance of new cytostomes and thus parasite feeding. By employing immunofluorescence assays alongside ultrastructure expansion microscopy (u-ExM) combined with super-resolution microscopy techniques, we resolved K13 as ring-shaped structures approximately 160 nm in diameter, which localise to the periphery of the parasite surrounding the neck of the cytostome. We performed live cell and u-ExM at various stages throughout the asexual life cycle and the morphology and number of K13 rings were compared between mutant and wild-type (WT) parasites. Our findings suggest that K13 mutant parasites form new K13

ASP Seminar Series continued

Our seminar speakers (from L-R) Capella Maguire, Australian National University, and Lizenn Delisle, Cawthron Institute, New Zealand

rings at a slower rate than WT parasites, and in some cases, the cytostomes in K13 mutants displayed altered morphologies. These findings provide new insights into how K13 mutations could reduce haemoglobin uptake, potentially linking this defect to artemisinin resistance.

Past ASP Online Seminar Series:

Our ASP Online Seminar Series event held on Friday 18th October 2024, 1pm AEDT, featured Arkasha Sadhewa, Menzies School of Health Research and Charles Darwin University presenting "Performance of Quantitative Point-of-Care Tests to measure G6PD activity: An Individual Participant Data Meta-Analysis" with co-chairs Jill Chmielewski, Walter and Eliza Hall Institute and Emma McHugh, University of Melbourne.

Arkasha Sadhewa is a PhD student at the Menzies School of Health Research, supervised by Dr. Benedikt Ley (Menzies), Dr.sc.hum Ari Satyagraha (Eijkman), Assoc. Prof. Kamala Thriemer (Menzies), and Prof. Ric Price (Menzies). Her PhD project focuses on G6PD deficiency (G6PDd) diagnostics for the safe deployment of vivax radical cure. It involves collating G6PDd prevalence data in Indonesia, assessing and improving the operational characteristics of G6PDd quantitative point of care diagnostics, and assessing the intra-individual variability in G6PD activity. Her presentation abstract is below:

Performance of Quantitative Point-of-Care Tests to measure G6PD activity: An Individual Participant Data Meta-Analysis

Arkasha Sadhewa1, Ari W. Satyagraha2, Wondimagegn Adissu3,4, Mohammad Shafiul Alam5, Anup Anvikar6, Germana Bancone7,8, Praveen K. Bharti6, Vinod K. Bhutani9, Santasabuj Das10, Muzamil Mahdi Abdel Hamid11, Mohammad Sharif Hossain5, Nitika6, Bernard A. Okech12, Lydia V. Panggalo13, Ric N. Price1,8,14, Arunansu Talukdar15, Michael E. von Fricken16,17, Ronald J. Wong9, Daniel Yilma4,18, Kamala Thriemer1, Benedikt Ley1,19

1.Menzies School of Health Research and Charles Darwin University, Global and Tropical Health Division, Darwin, Australia; 2.Eijkman Research Center for Molecular Biology, National Research and Innovation Agency, Cibinong, Indonesia; 3.School of Medical Laboratory Sciences, Jimma University, Jimma, Ethiopia; 4.Clinical Trial Unit, Jimma University, Jimma, Ethiopia; 5.International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh; 6.ICMR-National Institute of Malaria Research, New Delhi, India; 7.Shoklo Malaria Research Unit, Mahidol-Oxford Tropical Medicine Research Unit, Faculty of Tropical Medicine, Mahidol University, Thailand; 8.Centre for Tropical Medicine and Global Health, Nuffield Department of Clinical Medicine, University of Oxford, Oxford, United Kingdom; 9.Department of Pediatrics, Division of Neonatal and Developmental Medicine, Stanford University School of Medicine, Stanford, CA, USA; 10.National Institute of Cholera and Enteric Diseases, Kolkata, India

11.Institute of Endemic Diseases, University of Khartoum, Khartoum, Sudan; 12.Department of Preventive Medicine & Biostatistics, Uniformed Services University of the Health Sciences, F. Edward Hébert School of Medicine, Bethesda, MD, USA; 13.EXEINS Health Initiative, Jakarta, Indonesia; 14.Mahidol-Oxford Tropical Medicine Research Unit (MORU), Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand; 15.Kolkata Medical College Hospital, India; 16.One Health Center of Excellence, Emerging Pathogens Institute, University of Florida, Gainesville, FL, USA; 17.Department of Environmental & Global Health, University of Florida, Gainesville, FL, USA; 18.Department of Internal Medicine, Jimma University, Jimma, Ethiopia; 19.Menzies School of Health Research and Charles Darwin University, Division of Education, Darwin, Australia

Abstract: Background: Glucose-6-phosphate dehydrogenase (G6PD) deficiency is the main risk factor for severe haemolysis following treatment with 8-aminoquinolines (8AQ). The World Health Organization recommends G6PD testing prior to 8AQ-based hypnozoitocidal treatment.

Methods: We undertook an individual level meta-analysis of the performance of commercially available quantitative point-of-care diagnostics (PoC) compared with reference spectrophotometry. A systematic literature search (PROSPERO: CRD42022330733) identified 595 articles of which 16 (2.7%) fulfilled pre-defined inclusion criteria and were included in the

ASP Seminar Series continued

Our seminar speakers (from L-R) Maxine Smith, James Cook University and Lucas Huggins, The University of Melbourne

analysis, plus an additional 4 unpublished datasets. In total there were 12,678 paired measurements analyzed, 10,446 (82.4%) by STANDARD G6PD Test (SD Biosensor, RoK, [SDB]), 2,042 (16.1%) by CareStart G6PD Biosensor (AccessBio, USA, [CSA]), 150 (1.2%) by CareStart Biosensor (WellsBio, RoK [CSW]), and 40 (0.3%) by FINDER (Baebies, USA, [FBA]).

Findings: The pooled sensitivities of the SDB when measuring G6PD activity <30% of normal were 0.82 (95% confidence interval [CI]: 0.72-0.89) for capillary and 0.93 (95% CI: 0.75-0.99) for venous blood samples. The corresponding values for measuring <70% G6PD activity were 0.93 (95% CI: 0.67-0.99) and 0.89 (95% CI: 0.73-0.96), respectively. The pooled specificity of the SDB was high (>96%) for all blood samples and G6PD activity thresholds. Irrespective of the blood samples and thresholds applied, sensitivity of the CSA did not exceed 62%, although specificity remained high at both 30% and 70% thresholds (>88%). Only one study each for CSW and FBA was included. Sensitivities of the CSW were 0.04 (95% CI: 0.01-0.14) and 0.81 (95% CI: 0.71-0.89) at the 30% and 70% thresholds, respectively (venous blood samples). Sensitivities of the FBA were 1.00 (95% CI: 0.29-1.00) and 0.75 (95% CI: 0.19-0.99) at the 30% and 70% thresholds (venous blood samples). Specificities of the CSW and FBA were consistently high (>90%) at both thresholds. Sensitivity analyses found that participants' sex impacted test accuracy of SDB (odds ratio [OR]: 3.12 and 0.77 at the 30% and 70% thresholds, respectively) and CSA (OR: 0.61 at the 70% threshold).

Conclusions: The SDB performed significantly better than other tested PoCs. More evidence was available for the performance of the SDB compared to other PoCs, giving higher confidence in its utility in diagnosing G6PD deficiency.

ASP Seminar Series Friday 19th July 2024, 1pm AEST, featured Capella Maguire, Australian National University presenting "Exploring redundancies in central carbon metabolism in Toxoplasma parasites" and Lizenn Delisle, Cawthron Institute, New Zealand presenting "Health Challenges in Aquaculture: A Perkinsus olseni in Green-lipped Mussel case study", with co-chairs Jill Chmielewski, Walter and Eliza Hall Institute and Emma McHugh, University of Melbourne.

Capella Maguire undertook her Honours project in the ANU Toxo Lab supervised by Assoc. Prof. Giel van Dooren. She explored the role of the mitochondrion in central carbon metabolism in the apicomplexan parasite *Toxoplasma gondii.* Her Honours work raised several new questions about the exact nature of metabolic pathways in the parasite. Intrigued to find some answers she continued as a PhD student in the van Dooren Group. Capella's PhD is focused on mitochondrial metabolism in *T. gondii* primarily investigating the TCA cycle and its integration with key cytosolic metabolic pathways.

"Exploring redundancies in central carbon metabolism in Toxoplasma parasites"

Toxoplasma gondii is an apicomplexan parasite that causes severe disease in immunocompromised individuals, newborns, and livestock. This ubiquitous parasite uses central carbon metabolism pathways to generate energy and macromolecules for its proliferation and survival. In other eukaryotes, the mitochondrial tricarboxylic acid (TCA) cycle plays a key role in energy generation and the provision of biosynthetic intermediates. T. gondii harbours a complete functional mitochondrial TCA cycle, but the enzymes that catalyse the individual metabolic reactions remain understudied, and the overall importance of the TCA cycle is still uncertain. To address this knowledge gap, we investigated the importance and role of the TCA cycle in *T. gondii,* using a combination of forward and reverse genetics as well as physiological and metabolomic analyses. We found that the loss of some TCA cycle reactions led to severe defects in parasite proliferation and mitochondrial oxygen consumption in vitro, whereas loss of others had minimal impact. Using CRISPR/Cas9 genome-wide screening of TCA cycle mutants we discovered the presence of several functional redundancies. One

ASP Seminar Series continued

Our seminar speakers (from L-R) Connor McHugh, James Cook University and Tanapan Sukee, The University of Melbourne

notable redundancy was in the reactions catalysed by the mitochondrial TCA cycle enzyme malate:quinone oxidoreductase (MQO) and the cytosolic enzyme malate dehydrogenase (MDH), both of which mediate malate oxidation but in different subcellular compartments. Parasites which simultaneously lack both MQO and MDH exhibited a defective TCA cycle, impaired pyrimidine biosynthesis and accumulation of fumarate. We are currently investigating the essential metabolic process(es) that require malate oxidation in the parasite. Overall, our findings enhance the understanding of a key metabolic pathway and the flexible nature of central carbon metabolism in T. gondii.

Lizenn Delisle is a shellfish physiologist in the Aquatic animal health team at Cawthron Institute, New Zealand. She is a passionate marine scientist working on diseases in aquaculture and physiology of marine invertebrates. Currently, her research aims to identify pathogens associated with severe mortality episodes occurring on aquaculture species in New Zealand and their mechanisms of infection through the analyses of field samples, experimental infection in laboratory and in vitro propagation. Her research also focuses on mechanisms of host response to infection, by using large scale molecular approaches like transcriptomic, metabarcoding or proteomic and targeted analyses (PCR, qPCR) to improve understanding of shellfish resilience to pathogens which will support the aquaculture industry.

"Health Challenges in Aquaculture: A Perkinsus olseni in Green-lipped Mussel case study."

Perkinsus olseni is a protozoan parasite that infects a wide variety of molluscs and gastropods. Regularly associated with mass mortality events, P. olseni causes signficant economic losses in the aquaculture sector worldwide. P. olseni was first identified in New Zealand in clams from the Mangamangaroa stream near Auckland in May 2000. It rapidly spread to other shellfish species such as cockles and abalone in the North Island in 2001 and was first detected in the South Island in 2014, in Green-lipped mussels (GLM, Perna canaliculus). The presence of the parasite has never been clearly associated with large GLM mortality events. However it is regularly detected in young GLM and adults where it preferentially develops in the mantle, palps and gills. No gross pathology such as pustules are associated with Perkinosis, but histopathological examination of infected adult GLM reveals focal hemocytosis and hemocyte apoptosis and necrosis surrounding the parasite. The emergence of P. olseni in commercially important species such as Green-lipped mussel is a major concern, and further investigations are needed to assess the risk associated with this parasite for aquaculture industry. Using infected mussels collected in Nelson Bay, we established for the first-time an in-vitro culture of P. Olseni from Green-lipped mussel enabling the description of the parasite's life cycle and the definition of its thermal optimum. Our team recently conducted our first experimental infection in adult and juvenile Greenshell™ mussels providing valuable data on the disease progression and on the infectivity of the different Perkinsus life stages.

Online ASP Seminar Series Friday 14th June 2024, 1pm AEST, featured Maxine Smith, James Cook University presenting "A potential helminth-derived therapeutic for early life inflammatory bowel disease" and Lucas Huggins, The University of Melbourne presenting "Advanced diagnostic tools for the detection of vector-borne pathogens – from development to deployment ", with co-chairs Jill Chmielewski, Walter and Eliza Hall Institute and Emma McHugh, University of Melbourne.

Maxine Smith is a PhD student at the Australian Institute of Tropical Health and Medicine(AITHM) Cairns, working under the supervision of Dr Roland Ruscher. Her research focus is assessing helminth-

ASP Seminar Series continued

derived proteins as a novel and safe therapeutic for pediatric inflammatory bowel disease.

"A potential helminth-derived therapeutic for early life inflammatory bowel disease"

Inflammatory bowel diseases (IBD), including ulcerative colitis and Crohn's disease, are chronic inflammatory disorders, have no cure, and affect millions worldwide. Pediatric IBD often presents as a more aggressive disease than IBD in adults, contributing to 25% of the overall IBD cases. These heterogeneous diseases are prevalent in Westernised countries, where the widespread use of antibiotics and excessive sanitation have reduced exposure to many beneficial organisms. Research has indicated that external stimuli from essential co-evolutionary commensal microorganisms may play a vital role in regulating the immune system. One of particular interest is the gastrointestinal helminth, including hookworms, secrete a plethora of bioactive molecules with immunomodulatory properties, some of which have anti-inflammatory capacities. We have expressed individual hookworm-derived proteins to identify potential therapeutic properties during chronic inflammatory conditions. One recombinant protein of particular interest effectively reduced disease severity and alleviated inflammation induced by experimental colitis in mice prior to sexual maturity. We now seek to further validate the mechanism of action of the hookworm-derived protein by investigating binding strategies, intestinal barrier integrity and effects on intestinal immune cells. Ultimately, we aim to identify a novel and safe therapeutic to alleviate chronic inflammatory responses during pediatric IBD.

Lucas Huggins is a Postdoctoral Fellow specialising in molecular techniques within the Translational Research in Parasitology Group at the University of Melbourne Veterinary School. His current research focus is on the development of portable pan-pathogen molecular tools for companion animals with the overarching aim of safeguarding Australia against vector-borne disease bioincursions. His previous experience has been centred on exploring vector-borne pathogen diversity of stray dogs in Southeast Asia, whilst also investigating chemopreventive methods to protect them. This work has led to numerous intervention studies testing the efficacy of different ectoparasiticides for protecting Cambodian mine detection dogs from contracting vector-borne pathogen infections.

"Advanced diagnostic tools for the detection of vector-borne pathogens – from development to deployment"

Vector-borne pathogens (VBPs) generate significant morbidity and mortality in humans and other animals, particularly in many low to lower-middle income countries across the globe. Diagnosis of VBP infections can be challenging due to intermittent parasitaemia, frequent coinfections and the wide range of emerging, and novel VBP species encounterable. Hence, there is a critical need for refined diagnostic tools that are both sensitive and capable of detecting all VBP from a group of interest simultaneously. I will demonstrate how recent advances in nanopore sequencing technology have permitted our development of novel metabarcoding methods that can accurately characterise all bacterial, apicomplexan and filarial worm pathogens from blood and other sample types. Nanopore technology can sequence long-reads that can better classify pathogens to a species-level in a manner previously unachievable using short-read technologies. Moreover, nanopore sequencing devices such as the MinION™ are inexpensive, small and portable, even permitting the diagnosis of VBP from the field. The suite of nanopore-based diagnostic tools our laboratory has developed has transformed our ability to conduct investigations into the diversity and prevalence of VBPs in arthropod vectors and mammalian host species, including humans. We will discuss our rationale in advocating for the use of such techniques to better unpick pathogen transmission dynamics, elucidate cryptic diversity in parasite populations and unearth VBP disease risks for both animals and people.

Online ASP Seminar Series Friday 17th May 2024, 1pm AEST, featured Connor McHugh, James Cook University presenting "Necator americanus recombinant proteins as novel therapeutics for inflammatory disease" and Tanapan Sukee, The University of Melbourne presenting "Cloacinid nematode parasites of Australian marsupials; from molecules and morphology to ecology", with co-chairs Jill Chmielewski, Walter and Eliza Hall Institute and Emma McHugh, University of Melbourne.

Connor McHugh completed his honours under the supervision of Prof. Alex Loukas at James Cook University. He focused on the small-scale development of potential novel therapeutics from the secretome of human hookworms Necator americanus. He continued working within the Loukas lab group at JCU, undertaking his PhD. The current project is a continuation of the work completed during his honours. His PhD focuses on creating and screening a recombinant protein library from the secretome of N. americanus for developing immunoregulatory protein with potential novel therapeutic benefits in Type 2 diabetes and inflammatory bowel disease.

"Necator americanus recombinant proteins as novel therapeutics for inflammatory disease"

Experimental and naturally acquired human helminth infections have been shown to impart varying degrees of protection against a suite of inflammatory diseases. The proclivity of helminths to regulate their host immune response and suppress inflammation is attributed to the active release of excretory/secretory proteins (ESP) into the host tissues. Experimental infection of humans with helminths presents significant complications as a therapeutic modality due to their complex lifecycles, likely poor adoption, and unavoidable side effects in some subjects. As such, there is now considerable interest in identifying bioactive ESPs and making them more drug-like. Therefore, we created a recombinant library of N. americanus ESPs from both the adult and larval stage secretomes. We are screening the library in various in vitro and in vivo assays to identify

ASP Seminar Series continued

proteins with potent immunoregulatory properties. Thus far, we have identified proteins that could form the basis of novel therapeutics for treating type 2 diabetes, inflammatory bowel disease and rheumatoid arthritis based on their in vitro and/or in vivo bioactivities.

Dr. Tanapan Sukee is a postdoctoral researcher at Melbourne Vet School, University of Melbourne. Her Honours and PhD research with Professors Abdul Jabbar and Ian Beveridge focussed on taxonomy and understanding the biodiversity of a large group of nematodes parasitic in Australian macropodid and vombatid marsupials. Dr. Sukee's thesis on the 'Systematics of strongyloid nematodes parasitic in Australian marsupials' combined traditional morphological studies with molecular approaches to describe new species and contribute to advancing fundamental knowledge in wildlife parasitology. In her current role, Dr. Sukee has extended her fundamental research to include the study of trematodes – starting with the liver fluke, Fasciola hepatica.

"Cloacinid nematode parasites of Australian marsupials; from molecules and morphology to ecology"

This seminar will showcase the diversity of the Cloacinidae, a family of gastrointestinal nematodes parasitising Australian herbivorous marsupials including the kangaroos, wallabies and wombats. An overview of historical and current understanding of their morphology, ecology recent advances in molecular phylogeny will be presented, in addition to future areas to address beyond species discovery.

Email secretary@parasite.org.au with ideas for speakers, themes or chairs for future ASP Seminar Series presentations.

My Green Lab

Aaron Jex explains how "My Green Lab" ACT database can be useful for improving lab sustainability.

The ACT database provides a detailed environmental impact summary and rating scale for hundreds of common consumables and reagents used in our labs (Agilent, Eppendorf, Thermo, etc), as well as a variety of resources and interest groups aimed at reducing the environmental footprint of scientific labs. I've been looking for this sort or resource for several years, but I hadn't seen anything this comprehensive before.

ACT database maintained by mygreenlab can be found here https://actdatabase.mygreenlab.org/

Here is an example/explainer of the ACT impact labels for each product in their database.

In 2022 Rachael Relph from My Green Lab give a seminar on "Laboratory practices: Assessment on energy & water usage, waste generation"

See more information on the ASP website

https://www.parasite.org.au/climate-focus/ (scroll to the bottom of the page to see information about the Climate-Focus seminar series.

Check out more resources:

Becoming "My Green Lab" certified: https://www.mygreenlab.org/green-lab-certification.html

Becoming a "My Green Lab" Ambassador: https://www.mygreenlab.org/ambassador-program.html

Join the Freezer Challenge: https://www.freezerchallenge.org/register.html

"The time to green our labs is now" video: https://vimeo.com/375847945

Uta Frith. Fast Lane to Slow Down. Trends in Cognitive Sciences (2020) https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(19)30242-6

https://www.parasite.org.au/climate-focus/

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IJP

INTERNATIONAL JOURNAL FOR PARASITOLOGY

https://www.sciencedirect.com/journal/international-journal-for-parasitology

Editor In Chief: Brian Cooke

Facebook: www.facebook.com/IJPara
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March (54:03/04)
https://tinyurl.com/ajcsysh2

da Silva, G.G., Lopez, V.M., Vilarinho, A.C., Datto-Liberato, F.H., Oliveira, C.F., Poulin, R., Guillermo-Ferreira, R., 2024. Vector species richness predicts local mortality rates from Chagas disease. Int. J. Parasitol. 54, 139-145.

https://doi.org/10.1016/j.ijpara.2023.10.002

Original images provided by H.D. Araújo, Federal University of Triangulo Mineiro, Brazil.

International Journal for Parasitology continued

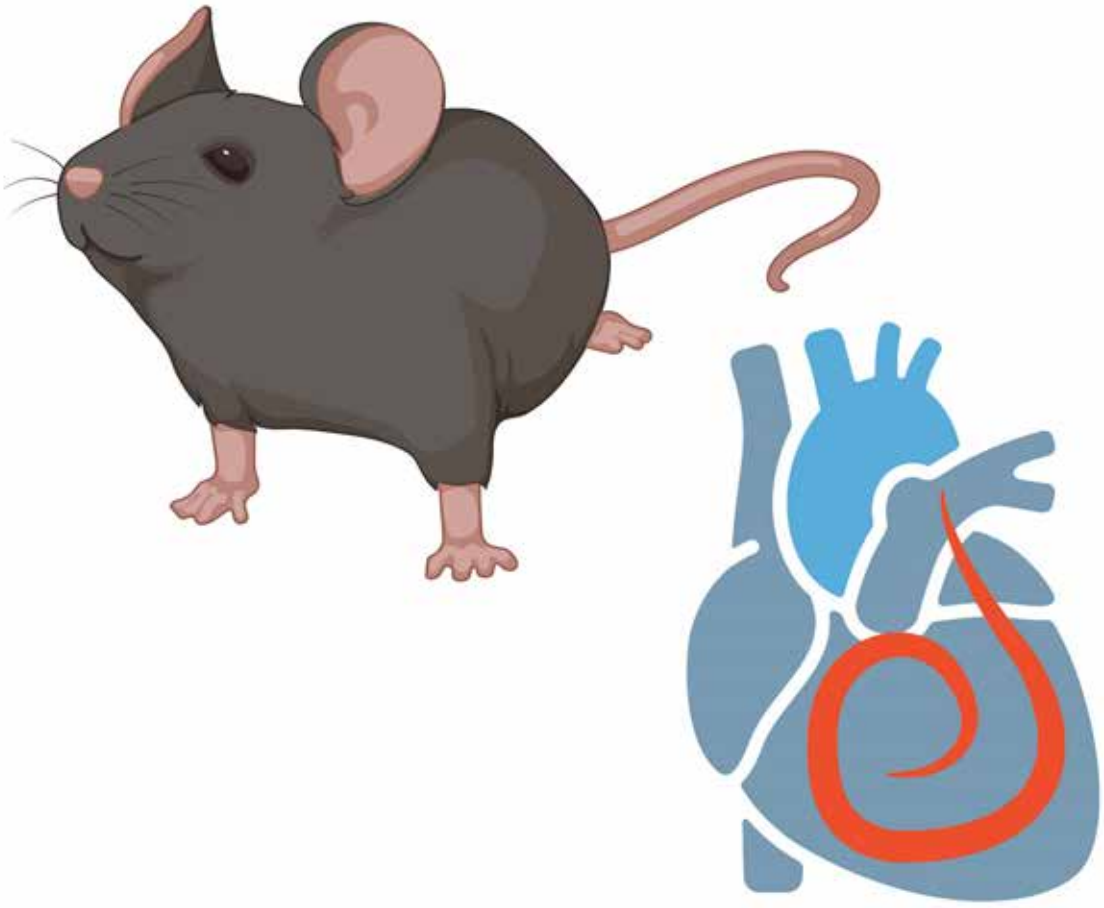
IJP

INTERNATIONAL JOURNAL FOR PARASITOLOGY

April (54:05)
https://tinyurl.com/3kbxnxcn

Risch, F., Ludwig-Erdmann, C., Hoerauf, A., Sager, H., Hübner, M.P., 2024. Development of adult Dirofilaria immitis worms in the Rag2/Il-2rγ-/- mouse model. Int. J. Parasitol. 54, 195-200.

https://doi.org/10.1016/j.ijpara.2024.01.004



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International Journal for Parasitology continued

IJP

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May (54:06) https://tinyurl.com/yj7ssr6m

Simoes-Barbosa, A., Pinheiro, J., 2024. Unconventional features in the transcription and processing of spliceosomal small nuclear RNAs in the protozoan parasite Trichomonas vaginalis. Int. J. Parasitol. 54, 257-266.

https://doi.org/10.1016/j.ijpara.2024.03.001

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International Journal for Parasitology continued

IJP

INTERNATIONAL JOURNAL FOR PARASITOLOGY

Recent IJP publication about the parasite *Pachysentis canicola* that has been infecting San Miguel Island foxes (Urocyon littoralis) has made it to the news.

"New parasite linked to decline of California's Channel Island fox" by Dr. Tim Sandle Published October 27, 2024 reports that researchers have uncovered a parasite that has been infecting San Miguel Island foxes (Urocyon littoralis), one of smallest fox species in the world. This causes the fox to almost go extinct.

Read this story online: https://www.digitaljournal.com/tech-science/new-parasite-linked-to-decline-of-californias-channel-island-fox/

This research story comes from recent IJP publication:

O. Alejandro Aleuy, Leslie W. Woods, Benjamin J. Padilla, Dennis Richardson, Juliann T. Schamel, Stacy Baker, Martín García-Varela, Charlotte Hammond, Sarah P. Lawson, Jasmine N. Childress, Jason Rohr, Kevin D. Lafferty, "The invasive acanthocephalan parasite *Pachysentis canicola* is associated with a declining endemic island fox population on San Miguel Island" International Journal for Parasitology, 2024, ISSN 0020-7519,

https://doi.org/10.1016/j.ijpara.2024.09.003

(https://www.sciencedirect.com/science/article/pii/S0020751924001711)

Abstract: In the late 1990s, the San Miguel Island fox (*Urocyon littoralis littoralis*) faced near-extinction. Fourteen of the 15 remaining foxes were placed into an island-based captive breeding program used to repopulate the island. Although the fox population in San Miguel reached pre-decline numbers by 2010, a second decline started around 2014, coincidental with a newly observed acanthocephalan parasite. To identify this introduced acanthocephalan species and determine the pathologic consequences of its infection on the health of foxes, we used an extensive record of island fox necropsies and associated parasite collections. In addition, we used detailed fox capture-recapture data to investigate population health and demographic trends of foxes before and after parasite emergence. We identify the parasite as *Pachysentis canicola,* a common acanthocephalan in mainland foxes in North America. The parasite was detected in 69% of the necropsied foxes from San Miguel Island and was not found in any of the other five Channel Island fox subspecies. Health impacts attributed to the acanthocephalan parasite, including erosive and ulcerative enteritis, transmural necrosis, and inflammation, were described in 47% of the foxes infected with the acanthocephalan. Despite infection with various other helminth parasite species, body condition remained good and the mortality rate low in San Miguel Island foxes until the arrival of the acanthocephalan. Body condition improved after 2018, perhaps due to increases in rainfall following a drought, but remained 27% lower than the pre-acanthocephalan period, which suggests that environmental conditions and parasitism jointly drive fox population dynamics.

https://www.sciencedirect.com/journal/international-journal-for-parasitology

Editor: B.M. Cooke

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IJP International Journal for Parasitology Parasites and Wildlife

https://www.sciencedirect.com/journal/international-journal-for-parasitology-parasites-and-wildlife

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Please enjoy a story about parasite conservation by Jack Ingelbrecht and three fabulous interviews from ASP members Storm Martin, Diane Barton, and Lesley Warner about their recently published IJP:PAW papers.

Western ground parrot Pezoporus flaviventris. Image credit: Arthur Ferguson, Department of Biodiversity Conservations and Attractions, WA Government.

Jack Ingelbrecht, David L. Morgan, Karissa O. Lear, Travis Fazeldean, Alan J. Lymbery, Bradley M. Norman, **Storm B. Martin**, "A new microbothriid monogenean *Dermopristis pterophilus* n. sp. from the skin of the Critically Endangered green sawfish *Pristis zijsron* Bleeker, 1851 (Batoidea: Pristidae) in Western Australia" International Journal for Parasitology: Parasites and Wildlife, Volume 17, 2022, Pages 185-193, ISSN 2213-2244, https://doi.org/10.1016/j.ijppaw.2022.01.006 (https://www.sciencedirect.com/science/article/pii/S2213224422000062)

Abstract: A new microbothriid monogenean *Dermopristis pterophilus* n. sp. is described from the skin of the Critically Endangered green sawfish *Pristis zijsron* Bleeker, 1851 in the Ashburton River delta, northern Western Australia. Analyses of the 28S ribosomal DNA marker and the molecular barcoding markers Histone 3 and Elongation Factor 1 alpha confirmed position among the Microbothriidae, with close affinity to the only other sequenced representative of *Dermopristis* Kearn, Whittington and Evans-Groing, 2010. The new species is morphologically consistent with the concept of *Dermopristis*; it has two testes, lacks a male copulatory organ and has a simple haptor. It is smaller than its two congeners *D. paradoxus* Kearn, Whittington and Evans-Gowing, 2010 and *D. cairae* Whittington and Kearn, 2011 and is most similar to the former, distinguished only in that it lacks the strong, transverse, parallel ridges on the ventral body surface that characterise that species. It is more easily distinguished from *D. cairae*, differing in body shape, possession of a seminal receptacle, and relative position and size of the haptor. It may further differ from both species by fine details of the gut diverticula, although these details are difficult to ascertain. Spermatophores were observed in the new species, similar to those previously reported for *D. cairae*. The new species exhibits site attachment preference: infections were greatest on and immediately adjacent to the host pelvic fins (including male reproductive organs, i.e. claspers), moderate in proximity to the dorsal and pectoral fins, few on the caudal fin and peduncle, and infrequently, isolated worms occurred elsewhere on the dorsal and ventral surfaces of the body. There was no incidence of infection on the head (including rostrum). We presume *D. pterophilus* is restricted to *P. zijsron* and thus likely faces the same threat of extinction.

1. Storm, through conservation interventions for the western ground parrot Pezoporus flaviventris (Psittaculidae) and the green sawfish Pristis zijsron (Pristidae), both Critically Endangered, researchers at Murdoch University have recently detected and proposed a new feather louse species Forficuloecus pezopori (Phthiraptera: Philopteridae) and a new fluke Dermopristis pterophila (Monogenea: Microbothriidae), respectively. Why is it important to study parasites and how can you establish if they are co-endangered?

Species-oriented conservation efforts provide an important but frequently unrealised opportunity for the discovery of unknown and, in many cases, similarly imperilled parasite taxa. The new parasites species here were first encountered by researchers at Perth Zoo's western ground parrot breeding program and the sawfish research team at Murdoch University's Centre for Sustainable Aquatic Ecosystems (Harry Butler Institute), respectively. As a parasite taxonomist, without these collaborations I would not be permitted, willing or able to track down and sample from these critically endangered vertebrates. In both these examples, we have concluded that the new parasite species are critically co-endangered, based on the presumption that they are specific for their respective host-species. This presumption is reasonable

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Parasites and Wildlife

The new fluke Dermopristis pterophila attached to skin of juvenile green sawfish. Image credit: David Morgan, Murdoch UniversityDermopristis pterophila, whole mount. Image credit: Jack Ingelbrecht

given the understanding of patterns of host-specificity among similar lice and flukes, although sampling effort for other parrots and elasmobranchs that might serve as additional hosts is patchy. Most importantly, host-specific and co-endangered parasites like these always face a greater threat of extinction than their hosts, because prevalence is rarely 100% and density-dependent factors may negatively impact the parasite population as the host population declines or becomes increasingly fragmented.

2. Tell us about the conservation prospects for these parasites and the recommendations to facilitate their persistence. How does any consideration for conservation of a parasite species trade-off with the health impacts for its host?

Ironically, interventions intended to conserve a target species may negatively impact or even expedite the extinction of dependent parasite species, either through intentional removal of parasites (e.g. routine delousing/deworming etc) or via interruption of the parasite life cycle when host animals are translocated or brought into captivity. For example, conservation interventions for the Iberian lynx, black-footed ferret, California condor, Guam rail and little spotted kiwi are all considered success stories, yet each effort directly resulted in the extinction of dependent louse species, victims of so-called conservation-induced extinction. Most host-specific parasites of vertebrates cause little or even negligible harm to wild host individuals and populations, and a single vertebrate species might host multiple dependent parasite taxa (the collective net species saved across the above examples is actually -1 because the condor lost two specific louse species!). In many cases, host-specific parasites can be passively conserved through efforts directed at the host and its habitat. Thus, for both the parrot and sawfish, we recommend that ongoing field surveys include a visual check for these ectoparasites when animals are captured and handled, but that infestations are not treated in otherwise healthy animals.

3. What is the significance of this research into the conservation of Australian wildlife?

It is likely that most species threatened with extinction are parasites, and that parasites will constitute most of the species that become extinct in the Anthropocene without ever becoming known to science. Yet parasites are rarely considered in the context of wildlife conservation. We hope that research like ours will promote greater awareness and pause for thought: our most important message is that researchers, veterinarians and conservationists working with endangered animals should consider the possibility that their focal species might host dependant and co-endangered parasite taxa unknown to science. Management plans should therefore consider the necessity and potential consequences of treating parasite infestations, and consider attempting to identify encountered parasite species, perhaps engaging collaboration with taxonomists. Wildlife conservation programmes are frequently expensive, challenging and long-term initiatives. We

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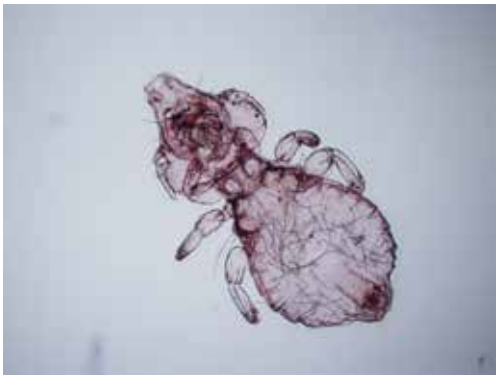
Parasites and Wildlife

think that the detection of new dependant species, and subsequent co-conservation of those species, should both be valued as positive outcomes.

4. Tell us what will be the next stage of your research?

Conservation intervention and research for both the western ground parrot and green sawfish are ongoing. As a parasite taxonomist, the discovery and description of new taxa is among my research foci, yet most species I examine are collected from hosts of no conservation concern. The opportunity to work with endangered parasite taxa has been exciting and stimulating. The parasitology team at Murdoch University pursues diverse research endeavours with various collaborators; I look forward to similar opportunities for discovery of co-endangered parasites from a variety of potential host species.



Images (top L-R)The new louse Forficuloecus pezopori, male, whole mount. Image credit: Sarah Keatley, Murdoch University
Green sawfish Pristis zijsron. Image credit: David Morgan, Murdoch University

Image below relates to Parasite conservation: how to classify the world's most threatened species story by Jack Ingelbrecht
Researchers scour the shallow sandflats of Shark Bay for the giant shovelnose ray (Photo: Lean Deschamps).

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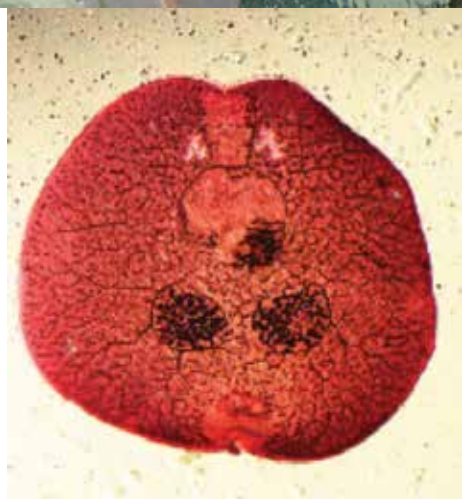
Parasites and Wildlife



Images (top) The Critically Endangered giant shovelnose ray (Photo: Leon Deschamps).

(bottom) A stained Dermopristis cairae specimen (Photo: Jack Ingelbrecht).

Parasite conservation: how to classify the world's most threatened species

Story by Jack Ingelbrecht

Contributions by Alan Lymbery, David Morgan and Leon Deschamps

Parasite conservation. It's a topic that has fascinated me ever since reading Eric Dougherty's article on parasite conservation paradigms in 2016. Until that point, I had never considered the importance of parasites beyond their role as agents of disease. Of course, the intrinsic value of parasites is incredibly nuanced, not only because of their importance towards ecosystem function and shaping free-living communities, but also their application as bioindicators of environmental health. However, in wildlife management, organisms tend to be viewed either as pests or priorities. We all know which of these that parasites are usually labelled as. Today, the majority of species threatened with extinction are parasites, being vulnerable not only to direct threats such as anthropogenic impacts, but also indirectly, via coextinction with their host. So, why is it that parasites are so rarely included on threatened species lists?

You may be surprised to learn that the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species – the most comprehensive threatened species list in the world – includes no platyhelminths or nematodes, and only a single arthropod, the pygmy hog louse (*Haematopinus oliveri*). A primary reason for this is that data on population trends and extent of occurrence, which are required for IUCN listings, are often difficult to obtain for parasites. One solution is to classify parasites by referencing the threatened status of their host. In the case of host-specific parasites, the logic behind this is simple; if a parasite occurs on only a single host species, then intuitively, it faces at least the same risk of extinction as that host; 'at least' being the keywords here. This is because host-specific parasites are likely to be more endangered than their hosts, because as the host population declines, parasite transmissions can fall below the threshold required to maintain the parasite population.

To best illustrate this, I wanted to share a story of some parasite work myself and colleagues at the Harry Butler Institute, Murdoch University, conducted recently on the giant shovelnose ray (*Glaucostegus typus*), one of the world's most threatened marine fishes. Currently listed as Critically Endangered on the IUCN Red List, the giant shovelnose ray has been subjected to intense fishing pressure over the past century, heavily targeted for their prized 'white' fins. Western Australia contains some of the last robust populations of this species in the world, where it is relatively common as far south as Shark Bay. Placed on the UNESCO World Heritage List in 1991, Shark Bay features superlative natural phenomena. The marine environment of Shark Bay has, however, been of interest to scientists long before its inscription onto the World Heritage List. It represents a transition zone between tropical and temperate conditions and between major marine ecological provinces, containing over 300 fish species of mostly tropical affinity. In 2022, I had the opportunity travel to Shark Bay, with the specific goal of cataloguing the ectoparasites of giant shovelnose rays in the region. With assistance from local legend Leon Deschamps and the Shark Ark Project, in roughly one week, we captured, examined and released nearly 100 giant shovelnose rays. It remains the most extensive parasite work ever conducted for this host to date.

During the first day of sampling, we grew accustomed to the sight of various leeches, and copepods, all of which are generalist parasites. However, on the morning of Day 2, something changed. We had just captured a 211 cm male shovelnose in one of the more remote parts of Shark Bay. We were conducting a routine examination when, at the base of the dorsal fin, we noticed a circular, translucent flatworm, well camouflaged against the denticles of its host. It was unlike any other parasite we had seen up to that point. The species in question was the monogenean *Dermopristis cairae*, of the family Microbothriidae. Monogeneans are one of the most host-specific parasite groups in the world, and this particular species occurs only on the giant shovelnose ray. *Dermopristis cairae* was first described in 2011, after specimens were found at the bottom of a fish tank following a freshwater bathing exercise in a Queensland aquarium. Until our field work in 2022, it had never been observed in the wild.

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Parasites and Wildlife

Images (clockwise from top left) Jack Ingelbrecht collecting ectoparasites from an immature giant shovelnose ray (Photo: Timothy Winship).
Researchers examine a giant shovelnose ray for ectoparasites (Photo: Leon Deschamps).
Dermopristis cairae in situ (Photo: Leon Deschamps).
Researchers on the lookout for giant shovelnose rays (Photo: Timothy Winship).

In the years since, we've examined roughly 200 giant shovelnose rays, along nearly 1000 km of the Western Australian coastline. In all that time, we have encountered *D. cairae* on only three individuals, all in Shark Bay. Why is this important? Well, the IUCN Red List has seven classifications for categorising organisms based on their risk of extinction. In order of increasing risk, these categories are 'Least Concern', 'Near Threatened', 'Vulnerable', 'Endangered', 'Critically Endangered', 'Extinct in the Wild' and 'Extinct'. This brings me to my final point. If a Critically Endangered host, like the giant shovelnose ray, carries an even rarer, host-specific parasite, like *D. cairae*, should they both share the same classification? Or should there be a new classification on the IUCN Red List, one that accurately recognises taxa that are even more threatened than Critically Endangered, but still occur in the wild? I leave that for you to decide.

Thanks Storm and Jack for your insightful interview and story!

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Parasites and Wildlife

Keira Brown, David J. Jenkins, Alexander W. Gofton, Ina Smith, Nidhish Francis, Shokoofeh Shamsi, **Diane P. Barton**,"The first finding of *Dictyocaulus cervi* and *Dictyocaulus skrjabini* (Nematoda) in feral fallow deer (Dama dama) in Australia," International Journal for Parasitology: Parasites and Wildlife, Volume 24, 2024, 100953, ISSN 2213-2244 , https://doi.org/10.1016/j.ijppaw.2024.100953 (https://www.sciencedirect.com/science/article/pii/S221322442400049X)

Feral deer are widespread throughout Australia with the capacity to impact livestock production via transmission of parasites. Samples of *Dama dama* (fallow deer), *Rusa unicolor* (sambar deer), *Cervus elaphus* (red deer) and an unidentified deer were sourced from various locations in south-eastern Australia for examination for parasites. Adult nematodes were collected from the lungs of all deer species across four separate geographical locations. The nematodes were identified as species of *Dictyocaulus* through both morphological and molecular means. Species identification based on morphological features was difficult, with many measurements from described species overlapping. Molecular analyses targeting three markers, namely 18S rRNA, ITS2, and cox1 revealed the presence of two distinct species: *Dictyocaulus cervi* and *Dictyocaulus skrjabini*. These are the first genetically confirmed reports of species of *Dictyocaulus* in feral deer in Australia, and although cross-transmission of species of *Dictyocaulus* with livestock has not yet been reported, it cannot be completely discounted without further research.

Images (next page from top to bottom) Figure 2 of the paper, with A showing the posterior end of a male *D. cervi* and B showing the posterior end of a male *D. skrjabini* collected from fallow deer showing the characteristic copulatory spicules and bursal rays. ASP 2023 (Darwin) where Keira presented on her Honours project and has 4 of the authors of the paper in it. From L:R - Nidhish Francis, Keira Brown, Di Barton, Maddy Ray (doing a PhD on ducks) and David Jenkins.

Title: Feral parasites and their hosts - unravelling the story

1. Di, please tell us about parasites found in feral deer in Australia why it is important to study?

Australia has an incredible endemic wildlife fauna and our knowledge of many aspects of their biology and ecology is unknown. This includes their parasite fauna. Australia also has an incredible number of feral animals that have been introduced to Australia. And many of these animals have brought their parasites with them. Parasites, as we know, have a range of effects on hosts, especially those that are not their natural hosts, ranging from changes to behaviour, reproductive capacity, ability to migrate and even death. Unfortunately, we do not know enough about these parasites, including such basic knowledge as what species of parasites these feral animals have, to be able to determine what, if any, impact they could be having on endemic fauna.

Another important aspect for studying the parasites of feral animals, especially things like feral deer, is that these animals are increasingly being hunted for consumption – by people and also as food for pets. Many of these feral animals carry potentially zoonotic parasites in their native ranges but many have not been examined in Australia to determine if they are also present here.

At CSU, the Parasitology Group has been surveying many feral animals, from introduced carp to deer to foxes and wild dogs, detailing the parasitic infections they have. Our interests are in identifying the parasites they carry, determining the host and geographical range of these parasites as well as trying to determine infection dynamics and impacts.

In collaboration with Alex Grofton and Ina Smith from CSIRO, we were looking at feral deer to actually see if they were infected with another parasite, the pentastomid *Linguatula*, as part of a different project. That parasite can be found as a larval (nymph) stage in the lungs, so we were looking for that and, instead, found the nematodes that were identified as *Dictyocaulus*. These are the first molecularly confirmed identifications of species of *Dictyocaulus* in feral deer in Australia.

2. Tell us more about the significance of finding adult nematodes from all deer species across four separate geographical locations?

Six species of feral deer occur in Australia and their populations have recently undergone expansion in terms of numbers as well as geographical distribution. Although deer are still farmed in many areas, the wild populations are known to cause extensive environmental damage as well as creating a variety of issues for farmers – deer damage fencing and graze in the same paddocks as livestock, creating issues with potential transmission of parasites. Recent research from the CSU Parasitology Group showed feral deer to be infected with *Fasciola hepatica*, which could have impacts for farmers as they try to control infections on their farms, only to have wild animals reinfesting paddocks.

Finding of adult nematodes suggest that the nematodes are capable of completing their life cycle. Although we found these parasites across three species of deer, we could only confirm the identity of the nematodes found in fallow deer. The distribution of the nematodes was found in areas concentrated in lower Great Dividing Range in southern NSW and north-eastern Victoria; deer collected in northern NSW were found to not be infected. However, we have not yet been able to examine deer from these areas over a lengthy time span to ensure that infections are not present in other times of the year. And we have not yet been able to examine deer from other areas of Australia.

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Parasites and Wildlife

3. In your findings you discovered two distinct nematode species: Dictyocaulus cervi and Dictyocaulus skrjabini, are these parasites a danger for livestock and what can be done to stop the transmission?

Our current knowledge and understanding of the host range and specificity of species of *Dictyocaulus* suggests that the species that infect deer do not transmit to livestock, nor vice versa. Within Australia, major livestock species and horses have been reported to be infected with other species of *Dictyocaulus*: cattle are infected with *D. viviparus*, sheep and goats are infected with *D. filaria*, and horses with *D. arnfeldi*.

The presence of *Dictyocaulus* in any host species can cause dictyocaulosis which impacts the productivity and health of that animal. Infection with lungworms, most likely an unidentified *Dictyocaulus* sp., was suggested to cause the death of a juvenile farmed sambar deer in New Zealand. However, there have been no reported cases of mortality caused by dictyocaulosis in deer in Australia.

It is more likely that an infection of *Dictyocaulus* will be transmitted between wild and farmed deer than between deer and other livestock, such as cattle. Cross host species transmission is considered unlikely but has not yet been definitively disproven.

However, as with the case of *F. hepatica* mentioned above, if feral deer are co-grazing with livestock and horses, there is a risk of parasite transmission which could affect a farmer's capacity to effectively control parasites on their farm.

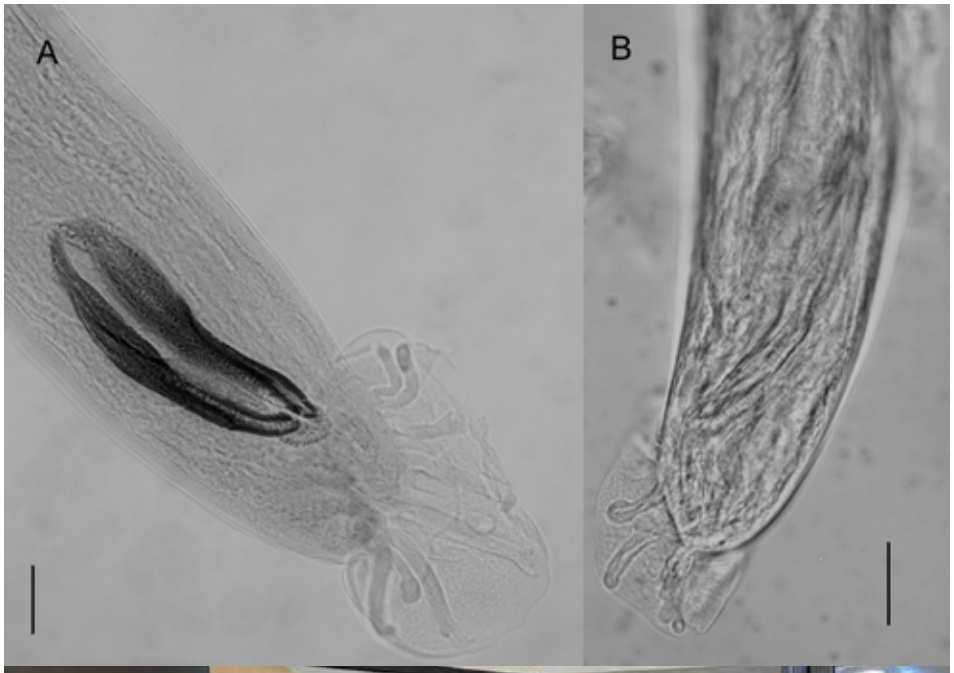
4. Tell us what will be the next stage of your research?

This research was part of an Animal Science Honours project for Keira Brown (the senior author), from which she has just had a 2nd paper published detailing infections with *Sarcocystis* in feral deer and pigs.

Since completing her Honours, Keira has commenced a PhD looking at parasites within the Family Sarcocystidae (including things like *Sarcocystis, Toxoplasma* and *Neospora*) across a range of feral and native animals, supervised by Shokoofeh Shamsi and myself (CSU) and Anthony Rendall (Deakin University).

As far as further research on *Dictyocaulus* in feral deer, we hope to be able to collect more specimens of *Dictyocaulus* from other species of deer and from across a wider geographical distribution to confirm the identification and distribution of species in those hosts. Once we have a good idea of what species of parasites actually exist in our wildlife, and especially the feral animals, we can then really determine interactions between wild and domestic animals in terms of parasitic infections.

Thanks Di for your insightful interview!



IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Parasites and Wildlife

L.R. Smales, J.A.L. Wood, L.A. Chisholm, "A review and comparison of the nematode assemblages of the Australian golden bandicoot, *Isoodon auratus*, the quenda, *I. fusciventer* and southern brown bandicoot, *I. obesulus* (Peramelidae), from material held in the south Australian museum," International Journal for Parasitology: Parasites and Wildlife, Volume 24, 2024, 100938, ISSN 2213-2244, https://doi.org/10.1016/j.ijppaw.2024.100938 (https://www.sciencedirect.com/science/article/pii/S2213224424000348)

A total of 333 vials of nematodes collected from three species of Isoodon (representing three individuals of *I. auratus*, 63 of *I. fusciventer* and 92 of *I. obesulus*) held in the Australian Helminthological Collection of the South Australian Museum were examined. Nematodes were identified and the nematode assemblages of the three hosts were compared with each other and with the assemblage of *Isoodon macrourus*. Two fully identified species were recovered from *I. auratus*, eight from *I. fusciventer* and 14 from *I. obesulus*. None of the species occurred in all three hosts; *Labiobulura inglisi* (Subuluridae), *Peramelistrongylus skedastos* (Dromaeostrongylidae) and *Asymmetracantha tasmaniensis* (Mackerrastrongylidae) all occurred in *I. fusciventer* and *I. obesulus*. Only *Pe. skedastos* was also found in *I. macrourus*. Sorensen's index of similarity, 27.2 %, showed that *I. fusciventer* and *I. obesulus* did not have similar nematode communities and neither were their communities similar to that of *I. macrourus*, 17.1 % and 39.0 % respectively. *Labiobulura inglisi* and *Linstowinema inglisi* were the dominant nematodes in the assemblage of I. fusciventer and *La. inglisi* was dominant in I. obesulus. The two hosts had nematode assemblages with unique species profiles; one species of *Linstowinema* in *I. fusciventer*, three in *I. obesulus*; a species of *Physaloptera* in *I. obesulus,* none in *I. fusciventer*; four species of strongylid; Asymmetracantha tasmaniensis the most prevalent in *I. fusciventer*, Peramelistrongylus skedastos the most prevalent in *I.obesulus*. The size of the geographic range is a probable determinant of the species richness of the nematode assemblages.

1. Please tell us about Helminthological Collection of the South Australian Museum and why it is important to conserve such records?

The AHC began life as the private collection of Prof T. Harvey Johnston. He started it while working in Qld and NSW and continued the initiative when he arrived in Adelaide in 1921 to take up a position at the University of Adelaide. On his death the responsibility for the collection passed on to his former students Madelaine Angel (Platyhelminths) and Pat Thomas (Mawson) (Nematodes). By 1972 Jack Arundel Melbourne University had begun to express his concern over the future of this valuable and still expanding collection and commenced negotiations with the ASP in 1974 and by 1975 was searching for funding to provide a permanent home. On the retirement first of Madelaine and then Pat the collection, with the agreement of the University of Adelaide, was moved to the Museum. The move was completed in 1980 and the collection was tended by them as honorary associates. By 1980, through series motions passed at the AGM's of 1977, '78, '79 and 1980 the Australian Society for Parasitology (ASP) endorsed the importance of the collection, agreed to foster initiatives for the proper curation of parasite collections and named the collection the Australian Helminthological Collection. At the same time (the 1970's) Warren Zeidler, Curator of Marine Invertebrates began the systematic registration of the helminth type and other material that had been deposited in the Museum in a V register. In 1977 David Lee, curator of Arachnids took over responsibility for the Museum's helminth collection and continued to register material in the V register. With the arrival of Pat Thomas in 1980 the helminths listed in the V register and the helminths of the University collection were combined as the AHC. Grants from ABRS to appoint temporary research assistants to support this work became available and I (Lesley Warner) was the first of these. With the help of Gareth Thomas an initiative to register all material on an electronic data base (first fox base then Microsoft acccess and now EMu) commenced. Recently the ASP provided funding to edit and manage the data. After David Lee's retirement as curator of helminths, Sylvie Pichelin was appointed and then, following her return to Queensland, Ian Whittington as Research scientist and Leslie Chisholm as collection manager took up responsibility for the AHC as an independent collection within the Museum's collections of invertebrates. Ian Whittington passed away and since Leslie Chisholm retired the collection is cared for 1 day a week by an hourly paid technician, Jo Wood, supported by ASP funding. As an honorary, I (Lesley Warner), have continued to work with the collection as have ASP members Ian Beveridge and Di Barton and I expect we will continue to work productively at the Museum until age overtakes us or if the honorary program discontinues.

Since 1921 the AHC has grown from a parasitologists private collection to a major international collection which is continually growing and expanding in scope. As of 2024 the collection consists of both wet specimens (in bottles) and prepared slide material upwards of 49, 000 lots including type material. Significant collections from Ian Whittington, Melbourne University wild life collection, Claus Rhode, some of my material and donations from others have been accessioned into the museum but yet to be registered.

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Parasites and Wildlife

2. You examined nematodes collected from three species of Isoodon (representing three individuals of I. auratus, 63 of I. fusciventer and 92 of I. obesulus) tell us more about your results and the significance to the hosts of these parasite species, the Australian golden bandicoot?

Without the data from the AHC it would not have been possible to carry out the bandicoot helminth project. The result has been the documenting (in 6 papers) as much as is known about the nematode and *acanthocephalan* species that live in each of the extant bandicoot species. I had my own collecting records from the 1990's of course but there have been many other collectors who deposited their material in the AHC. Through the collection we were able to analyse the results of all the collectors and get an estimate of the number of species and the mix of species that infects each bandicoot species. What are they and what are the differences between each of the bandicoot species. The down side of this is not having enough data to analyse levels of infection with time for each helminth species to see what if any species have been lost as host range has declined; for example with the woylie in our PAW paper, but it does allow an overall analysis of the helminth communities being studied. With the golden bandicoot, we have only a few records from a few hosts but what we have fits in with what you might expect in any species of bandicoot. What we cant know is whether this represents a significant loss of nematode species from golden bandicoots or just chance sampling and if it is species loss how does that effect the fitness for survival of the host.

There have been analyses carried out over the years as to the ecological importance of helminth communities in influencing the fitness of the host populations they infect. Simplistically, if the components of one food web level, the parasites, represents 50% of the species in that food web, as has been estimated, then it would be foolish to ignore that half of the system's components. We need to know what those components are and how they fit together within the system if we want to successfully manage our environment and protect endangered and threatened species. A more sophisticated analysis was recently published in IJP PAW by Lymbery & Smit 2023.

Graphical Abstract: "A review and comparison of the nematode assemblages of the Australian golden bandicoot, *Isoodon auratus*, the quenda, *I. fusciventer* and southern brown bandicoot, *I. obesulus* (Peramelidae), from material held in the south Australian museum"

In the process of trawling through and updating the records of nematodes from bandicoots several new species were found and described and comparisons between bandicoot species nematode communities were made. Such information provides the foundation for ecological analyses and of itself becomes part of the records of the biodiversity of Australian fauna. Until we know what is there we cant develop plans to conserve it.

3. Tell us what will be the future investigations into the parasites held in the Helminthological Collection of the South Australian Museum?

Currently I am working through a review of a species of the nematode family *Spiruridae* *Spirura andersoni* a species that occurs in rats and squirrels (rodents) from India through south east asia papua new guinea and Australia which is based on material I and others have collected that has been deposited the The Natural History Museum London, the Smithsonian Washington the Bishop Museum Hawaii and the AHC. I am looking to work out geographical and host distributions, as well as the robustness of the species identifications. I am also examining acanthocephalans from Australian fish collected by Tom Cribb and others that have been accessioned by the Museum but need to be identified before they are registered.

I am no longer enthusiastic about going into the field but there are still worthwhile projects that can be designed to improve the value of the AHC.

Em Prof Lesley Warner,
Parasitology Section,
South Australian Museum
Fellow of the Australian Society for Parasitology

Thanks Lesley for your insightful interview!

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
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https://www.sciencedirect.com/journal/international-journal-for-parasitology-drugs-and-drug-resistance

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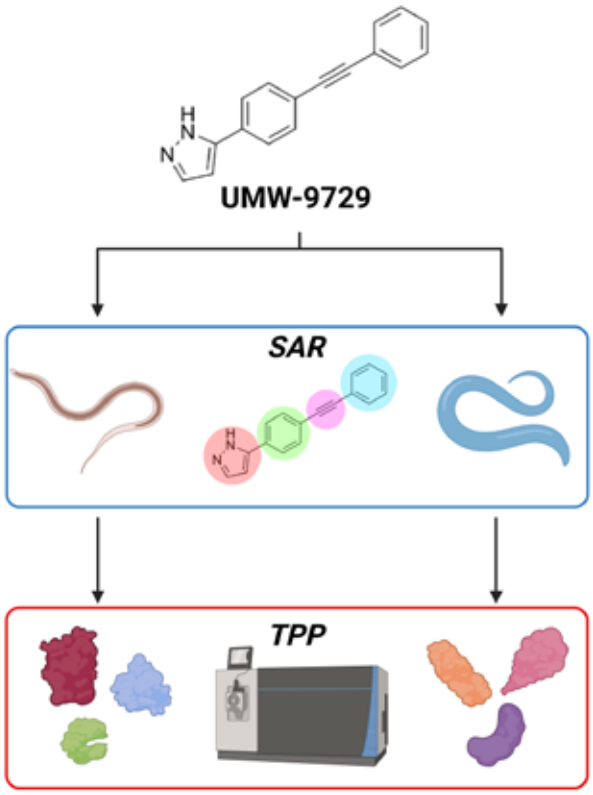
Please enjoy three interviews with ASP early career researchers Harrison Shanley, and Aya Taki, 2024 Elsevier Invited Lecturer, Carmen Faso and Roger Prichard with recently published IJP:DDR papers.



Images (above) Harrison Shanley (top) and Aya Taki and (right) Graphical abstract "Comparative structure activity and target exploration of 1,2-diphenylethynes in *Haemonchus contortus* and *Caenorhabditis elegans*"

Harrison T. Shanley, Aya C. Taki, Nghi Nguyen, Tao Wang, Joseph J. Byrne, Ching-Seng Ang, Michael G. Leeming, Nicholas Williamson, Bill C.H. Chang, Abdul Jabbar, Brad E. Sleebs, Robin B. Gasser, "Comparative structure activity and target exploration of 1,2-diphenylethynes in *Haemonchus contortus* and *Caenorhabditis elegans*". International Journal for Parasitology: Drugs and Drug Resistance, Volume 25, 2024, 100534, ISSN 2211-3207, https://doi.org/10.1016/j.ijpddr.2024.100534 (https://www.sciencedirect.com/science/article/pii/S2211320724000150)

Abstract: Infections and diseases caused by parasitic nematodes have a major adverse impact on the health and productivity of animals and humans worldwide. The control of these parasites often relies heavily on the treatment with commercially available chemical compounds (anthelmintics). However, the excessive or uncontrolled use of these compounds in livestock animals has led to major challenges linked to drug resistance in nematodes. Therefore, there is a need to develop new anthelmintics with novel mechanism(s) of action. Recently, we identified a small molecule, designated UMW-9729, with nematocidal activity against the free-living model organism *Caenorhabditis elegans*. Here, we evaluated UMW-9729's potential as an anthelmintic in a structure-activity relationship (SAR) study in *C. elegans* and the highly pathogenic, blood-feeding *Haemonchus contortus* (barber's pole worm), and explored the compound-target relationship using thermal proteome profiling (TPP). First, we synthesised and tested 25 analogues of UMW-9729 for their nematocidal activity in both *H. contortus* (larvae and adults) and C. elegans (young adults), establishing a preliminary nematocidal pharmacophore for both species. We identified several compounds with marked activity against either *H. contortus* or *C. elegans* which had greater efficacy than UMW-9729, and found a significant divergence in compound bioactivity between these two nematode species. We also identified a UMW-9729 analogue, designated 25, that moderately inhibited the motility of adult female *H. contortus in vitro*. Subsequently, we inferred three H. contortus proteins (HCON_00134350, HCON_00021470 and HCON_00099760) and five C. elegans proteins (F30A10.9, F15B9.8, B0361.6, DNC-4 and UNC-11) that interacted directly with UMW-9729; however, no conserved protein target was shared between the two nematode species. Future work aims to extend the SAR investigation in these and other parasitic nematode species, and validate individual proteins identified here as possible targets of UMW-9729. Overall, the present study evaluates this anthelmintic candidate and highlights some challenges associated with early anthelmintic investigation.

Q1: Please tell us about your latest publication in relation to the anthelmintic discovery program and why it's important?

In this publication we explored the efficacy and mechanisms of a novel compound class, containing a core 1,2-diphentylethyne structure, that was discovered from a phenotypic-screen against two nematode species - *Haemonchus contortus* (barber's pole

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Drugs and Drug Resistance

worm), a significant parasite of livestock, and *Caenorhabditis elegans*, a free-living nematode. Both species represent useful models for anthelmintic drug discovery, because they can be readily maintained and produced in a laboratory setting and are both related to numerous socioeconomically important nematodes (clade V; order Strongylida) of animals and humans. Moreover, the extensive availability of genomic, transcriptomic and proteomic resources and tools for these two species provides a solid basis for detailed investigations of the modes and mechanisms of action of currently-available and novel anthelmintic compounds. The use of *C. elegans* as a substitute model has been particularly instrumental in the target deconvolution of several important anthelmintic drug classes – e.g., levamisole, ivermectin and monepantel. By elucidating the activity and targets of lead candidates using these two model nematode species, we can pave the way for the design of more effective and targeted anthelmintic treatments.

First, we synthesised an array of analogues based on the hit compound, UMW-9729, for their nematocidal activity against both *H. contortus* (larvae and adults) and *C. elegans* (young adults), establishing a preliminary nematocidal pharmacophore for both species. We identified several compounds with marked activity against either *H. contortus* or *C. elegans* which had greater activity than UMW-9729, and found a significant divergence in compound bioactivity between these two nematode species. We also identified a derivative of UMW-9729 which moderately inhibited the motility of adult female *H. contortus in vitro*. Subsequently, using thermal shift proteomics, we identified three *H. contortus* proteins (HCON_00134350, HCON_00021470 and HCON_00099760) and five C. elegans proteins (F30A10.9, F15B9.8, B0361.6, DNC-4 and UNC-11) that were stabilised in the presence of UMW-9729; however, no conserved protein target was shared between the two nematode species.

We found the significant divergence in bioactivity in the same analogues and between the two species to be an unexpected but interesting finding. We also noted the absence of conserved nematode protein targets between the two species. It is possible that a difference in compound activity relates to divergent nematode protein targets, suggesting that anthelmintic action is achieved in both organisms via unique drug-target interactions. It underscores the need for caution when extrapolating results from free-living to parasitic species, and is particularly significant as this is the first study to utilise these two nematode species to conduct an in-depth investigation into target deconvolution and structure-activity relationship (SAR).

Q2: What are some of the challenges associated with early anthelmintic investigation?

In the early stage of anthelmintic development for human health, the deconvolution of a compounds mechanism(s) of action increases the probability of progressing to the commercial market. Historically, in animal health, antiparasitic target identification and validation have not been pursued, with most drugs passing clinical trials without a complete understanding of drug-host or drug-parasite interactions. Unravelling the mechanism(s) of the action of anthelmintics is necessary, not only to identify adverse effects on host health, but to also understand how resistance may (eventually) develop, and to establish unique protein targets for therapeutic development. In *C. elegans*, genomic-focussed deconvolution efforts have made a substantial impact – however, in many instances, these techniques are limited in parasites, due to biological or life cycle restraints. It has been proposed that using two genetically related, yet biologically distinct, nematode species – such as *H. contortus* and *C. elegans* – could enable us to identify a broad-spectrum anthelmintic with a unique, conserved nematode-specific mechanism of action. However, our recent investigations of novel candidate drug targets on *H. contortus* and *C. elegans* have given some insights into the utility and limitations of *C. elegans* as a comparator model for *H. contortus* (see Q1).

Conducting early-stage in vitro testing on adult parasitic worms helps us identify suitable candidates for development. Testing larvae procured from faeces of infected animals is advantageous because we can collect millions of them in a non-invasive manner over a short period of time. However, during the parasite life cycle, the adults are the most pathogenic stage of development and are, thus, the predominant target organism. In vitro assessment of adult worms is more laborious, costly and time-consuming as we must euthanise the host to yield live worms. In the case of UMW-9729, we only tested it on adult worms after a significant effort towards analogue synthesis and testing on larvae. Ultimately, this compound was shown to be ineffective at killing the adult worm stage. Although several factors (e.g., protein expression changes, pharmacokinetic differences) could contribute to the divergence in activity against larvae versus adult worms, results indicated that we should test compounds on adult worms *in vitro* prior to conducting in-depth SAR investigations.

Parasitic worms exhibit significant genetic diversity, which can affect drug efficacy. Variations in genetic makeup can lead to different responses to treatment, complicating the development of universally effective anthelmintics. In the case of *H. contortus*, evidence of marked genetic variability both within and between populations from distinct countries/

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Drugs and Drug Resistance

continents has raised questions about the nature and extent of variation in genomic structure and composition between/among disparate geographic locations and isolated populations (with no genetic exchange). At the Gasser laboratory, we have been elucidating the genomic similarity (synteny) of different strains of *H. contortus*, and discovering marked differences in genomic structure/gene arrangements, distribution of nucleotide variability and orthology between strains (unpublished; under review). Using a machine-learning approach, we are currently working towards eliminating the challenges of genetic variability by predicting a subset of parasite-specific, single-copy genes with crucial functions in parasitic worms.

Q3: Aya and Harrison, tell us about some of the highlights of working within a team on this anthelmintic discovery program.

(Harrison) Working within the anthelmintic discovery program has provided me with exposure to the various disciplines that contribute to drug development and parasitology. At the early stages of my career, I've found this 'holistic' approach to research fascinating, and tremendously impactful on my learning and growth as a researcher. Moreso, our group emphasises the dissemination of critically-evaluated research, through both conferences (such as our beloved ASP conference) and publications, and as such has given me many fantastic opportunities to discuss science with experts across various fields. These learning opportunities could not have been made possible without the strong support of my supervisors and lab-mates, and the relationships I've built here over my PhD candidature are absolutely a highlight. Finally, and it shouldn't need to be said here, but conducting research in the anthelmintic field is just plain fun! From compound synthesis, to nematode culturing, to testing those compounds and seeing the effects, every stage is exciting!

(Aya) Working within the anthelmintic discovery program has been incredibly rewarding for me, especially due to our collaboration with numerous academic, industry and philanthropic partners who are at the forefront of drug development for infectious diseases globally. Our cross-disciplinary approach, involving experts from molecular biology, medicinal chemistry, pharmacology, veterinary science, global health and more, fosters a cross-fertilisation of ideas and techniques that significantly enhances our ability to develop novel solutions within the context of Public-Private Partnerships. This is something I don't often get to see in the academic world, and it makes our work together even more exciting and impactful. Personally, these partnerships have been fantastic for my professional growth. I've built lasting relationships and felt a strong sense of community that has really enriched my career and passion for advancing anthelmintic research.

Thanks Harrison and Aya for your insightful interview!

2024 Elsevier Invited Lecturer, Carmen Faso

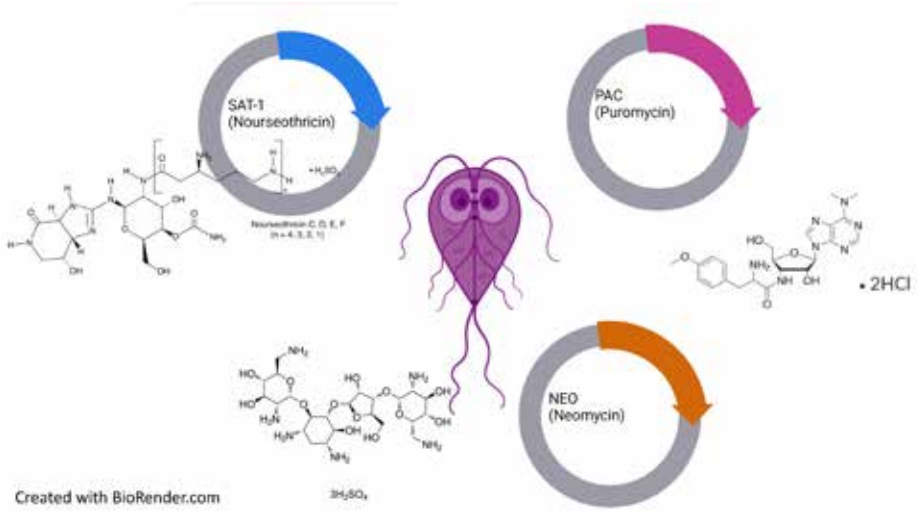
Corina D. Wirdnam, Dawid Warmus, **Carmen Faso**, "Nourseothricin as a novel drug for selection of transgenic *Giardia lamblia*" International Journal for Parasitology: Drugs and Drug Resistance, Volume 25, 2024, 100543, ISSN 2211-3207, https://doi.org/10.1016/j.ijpddr.2024.100543 (https://www.sciencedirect.com/science/article/pii/S2211320724000241)

Functional gene and protein characterizations in parasitic protists are often limited by their genetic tractability. Despite the development of CRISPR-Cas9-derived or inspired approaches for a handful of protist parasites, the overall genetic tractability of these organisms remains limited. The intestinal parasite *Giardia lamblia* is one such species, with the added challenge of a paucity of reliable selection markers. To address this limitation, we tested the feasibility of using Nourseothricin as an effective selection agent in *Giardia*. Here, we report that axenically-grown WB *Giardia* cells are sensitive to Nourseothricin and that engineering expression of the streptothricin acetyltransferase (SAT-1) gene from Streptomyces *rochei* in transgenic parasites confers resistance to this antibiotic. Furthermore, we determine that SAT-1-expressing parasites are cross-resistant neither to Neomycin nor Puromycin, which are widely used to select for transgenic parasites. Consequently, we show that Nourseothricin can be used in sequential combination with both Neomycin and Puromycin to select for dual transfection events. This work increases the number of reliable selection agents and markers for *Giardia* genetic manipulation, expanding the limited molecular toolbox for this species of global medical importance.

IJP INTERNATIONAL JOURNAL FOR PARASITOLOGY
Drugs and Drug Resistance

1. Carmen, please tell us about your research and what first interested you about parasites?

I come from a solid molecular and cell biology background, with a focus on plant cell biology. Once I discovered what parasite cell biology looks like, its quirks and incredible takes on organelles, subcellular structures and at times highly divergent molecular machineries, I was hooked! For this reason, I joined Adrian Hehl's lab at the Institute of Parasitology at the University of Zurich, focussing on protein trafficking mechanisms in *Giardia lamblia* (syn. Intestinalis, duodenalis). In my group, we focus on unusual secretory mechanisms, often involving the release of virulence factors, at the parasite-host interface. To do this, we use a healthy and hopefully balanced combination of proteomics, microscopy, phylogenomics and both in vivo and in vitro approaches, to understand what lies upstream of non-secretory virulence factor release. At the same time as release, we investigate uptake and endocytic mechanisms at *Giardia*'s unique endocytic compartments through which it feeds, and are attempting to unravel the evolutionary history of this parasite's unusual endocytic complement. In a nutshell, we look at the ins and outs of *Giardia* trafficking.



Graphical abstract of "Nourseothricin as a novel drug for selection of transgenic *Giardia lamblia*"

2 Tell us why it is important to study the parasite Giardia lamblia?

Giardia causes giardiasis, a globally distributed antropo-zoonotic (although there is debate here) diarrheal disease affecting ca. 300 million people a year, and these are just the diagnosed cases. It is likely to affect many many more, especially in resource-deprived settings where access to clean water is a problem. What concerns me the most about giardiasis is that, as almost every diarrheal disease, it is a scourge of very young children who often develop chronic diarrhea and do not thrive, both physically and cognitively, as they have the potential to do. As a mother to two young boys, this affects me on a personal level. So I love the parasite's cell biology, but I take the illness it causes very seriously. What is also noteworthy is that the incidence of giardiasis in affluent countries is a lot higher than previously thought, and we do not yet fully understand how early childhood giardiasis impacts gut development and adult gut pathologies. There might be a correlation but more qualified colleagues are investigating this very well.

3. What is the significance of increasing the number of reliable selection agents and markers for Giardia genetic manipulation?

Giardia is a wonderful lab pet; easy to grow, not fussy in terms of media, well-behaved, has a sequenced genome, can be transfected. It is however not a great genetic model. With a tetraploid status in its vegetative state, carrying out functional characterizations of target genes by knocking-them out can be very challenging and time consuming, as we reported in 2016 with the first *Giardia* knock-out (Ebneter, 2016). In the meantime, other groups (Dawson, Dolezal) have engineered versions of CRISPR-Cas to work in *Giardia* and have been very successful overall at knocking-down target gene expression, less so at ablating it entirely. For this reason, it is essential that the community have access to as many reliable selection tools as possible, to allow for sequential gene disruption or ablation, and recovery of a transgenic line. This is what prompted us to investigate Nourseothricin, an antibiotic successfully used in both *Trypanosoma* and *Leishmania* for selection of transgenic cells and never before reported for use in *Giardia*. With three selection markers now, we can go in and, simultaneously, knock out 3 out of 4 alleles. We have to then figure out what to do with the 4th one.

4. Tell us what will be the next stage of your research?

We are currently obsessed with peripheral endocytic compartments (PECs), the unique feeding organelles I mentioned previously. These tiny (200nm) structures

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Drugs and Drug Resistance

appear to be capable of bidirectional transport, mediating release and uptake within the same luminal space. They have the ability to transiently fuse with the plasma membrane without dissolving into it, a property I find incredible. They are, to my knowledge, the only endosomal compartment that can directly access the extracellular space, another first. We shall hopefully spend quite some time understanding how they do all that they do, with a reduced set of conserved proteins and many whose functions remain to be elucidated! Thank you for your interest in our research!

Thanks Carmen for your insightful interview!

ASP member Roger Prichard

Donato Traversa, Anastasia Diakou, Mariasole Colombo, Sohini Kumar, Thavy Long, Serafeim C. Chaintoutis, Luigi Venco, Gianluca Betti Miller, **Roger Prichard**, "First case of macrocyclic lactone-resistant *Dirofilaria immitis* in Europe - Cause for concern" International Journal for Parasitology: Drugs and Drug Resistance, Volume 25, 2024, 100549, ISSN 2211-3207, https://doi.org/10.1016/j.ijpddr.2024.100549 (https://www.sciencedirect.com/science/article/pii/S2211320724000307)

Heartworm disease caused by the nematode *Dirofilaria immitis* is one of the most important parasitoses of dogs. The treatment of the infection is long, complicated, risky and expensive. Conversely, prevention is easy, safe, and effective and it is achieved by the administration of macrocyclic lactones (MLs). In recent years, *D. immitis* strains resistant to MLs have been described in Southern USA, raising concerns for possible emergence, or spreading in other areas of the world. The present study describes the first case of ML-resistant *D. immitis* in a dog in Europe. The dog arrived in Rome, Italy, from USA in 2023. Less than 6 months after its arrival in Italy, the dog tested positive for *D. immitis* circulating antigen and microfilariae, despite it having received monthly the ML milbemycin oxime (plus an isoxazoline) after arrival. The microfilariae suppression test suggested a resistant strain. Microfilariae DNA was examined by droplet digital PCR-based duplex assays targeting four marker positions at single nucleotide polymorphisms (SNP1, SNP2, SNP3, SNP7) which differentiate resistant from susceptible isolates. The genetic analysis showed that microfilariae had a ML-resistant genotype at SNP1 and SNP7 positions, compatible with a resistant strain. It is unlikely that the dog acquired the infection after its arrival in Europe, while it is biologically and epidemiologically plausible that the dog was already infected when imported from USA to Europe. The present report highlights the realistic risk of ML-resistant *D. immitis* strains being imported and possibly transmitted in Europe and other areas of the world. Monitoring dogs travelling from one area to another, especially if they originate from regions where ML-resistance is well-documented, is imperative. Scientists, practitioners, and pet owners should be aware of the risk and remain vigilant against ML-resistance, in order to monitor and reduce the spreading of resistant *D. immitis*.

LJ: Roger why is heartworm disease caused by the nematode Dirofilaria immitis one of the most important parasitoses of dogs?

RP: *Diro-filaria* has the origins from 'dire' or 'terrible' and 'filaria' relates to 'filament'. In fact, adult *D. immitis* are long (15 to 30 cm) filament-like (300 µm width) worms and these filamentous worms can cause terrible disease in dogs and other animals. *D. immitis* infection leads to the development of adult worms in the pulmonary arteries which often causes pulmonary hypertension. With high worm burdens, worms can reside in the right atrium and right ventricle of the heart, and the vena cava, causing caval syndrome. Caval syndrome often causes dysfunction of the heart valves, blood flow impairment, hemolysis, liver, kidney, and heart failure, and may result in the death of the dog. Dogs which live with the disease frequently show lethargy and incapacity to tolerate exercise.

Once the adult nematode infection is established, the worms may survive for some years unless the adults are removed with a series of deep intramuscular injections with an arsenical drug or surgical removal of the worms. Both types of treatment carry risks for the life of the dog and are expensive. The macrocyclic lactones (MLs, e.g.,

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Drugs and Drug Resistance

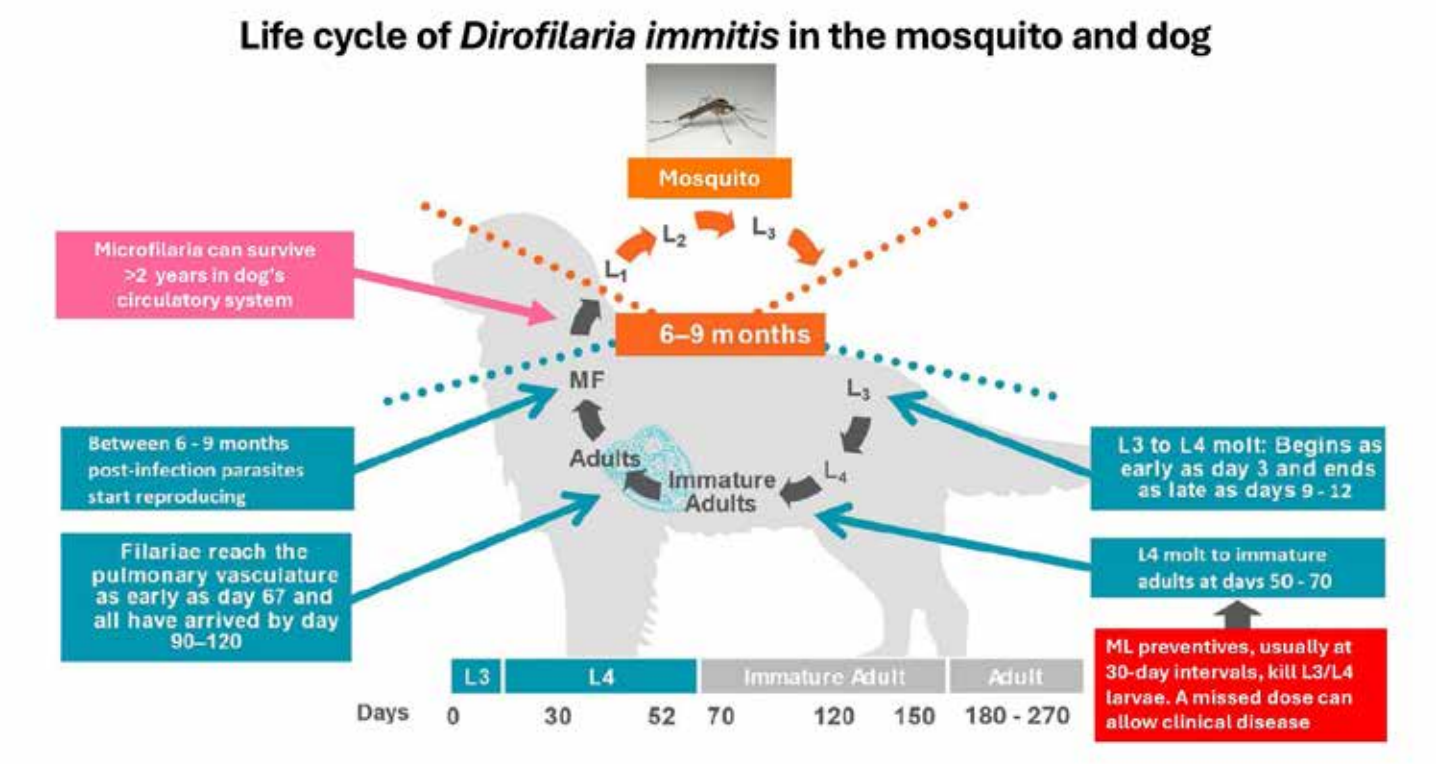

Image courtesy Roger Prichard

ivermectin, milbemycin oxime, moxidectin, selamectin, etc.) were discovered to be highly efficacious in preventing the development of the larval L3 and L4 stages to adult worms if administered to a dog after the bite of an infected mosquito (preventive medication usually required within about 30 days of the mosquito bite). This ML prevention of the disease, which is relatively inexpensive and very safe, has become the key means to keep dogs (and cats) safe from heartworm disease. Dog owners are advised to have their pets on ML heartworm preventives immediately before, during, and for a period after the mosquito transmission season.

In areas of Australia where heartworm is transmitted that period is typically about 6 – 8 months of the year but varies according to mosquito abundance and days when the temperature is above 14°C when development of larval stages can occur in the vector. Heartworm disease is endemic in much of the warm temperate to tropical regions of the world, including much of eastern Australia. It is increasingly found in temperate regions, such as in Europe and southern Canada, with the spread being caused by the transport of dogs and climate change favouring mosquito breeding.

LJ: Tell us why there are concerns for possible emergence, or spreading of D. immitis strains resistant to MLs in other areas of the world?

RP: In the USA, *D. immitis* infections in dogs are now found in every state and for some years heartworm prevention has been recommended 12 months of the year. MLs have been used for this purpose for over 36 years. However, according to survey data from the American Heartworm Society, the problem is becoming significantly worse, despite the recommendations for year-round ML preventive treatment. Indications of possible ML preventives 'loss of efficacy" were first reported by the US Food and Drug Administration in 2005 and we were able to definitely confirm true ML resistance in studies we reported between 2011 and 2015. The ML resistance situation in parts of the USA, particularly along the Lower Mississippi River valley, has now become alarming. The increasing prevalence of heartworm infection in dogs, in the USA,

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Drugs and Drug Resistance

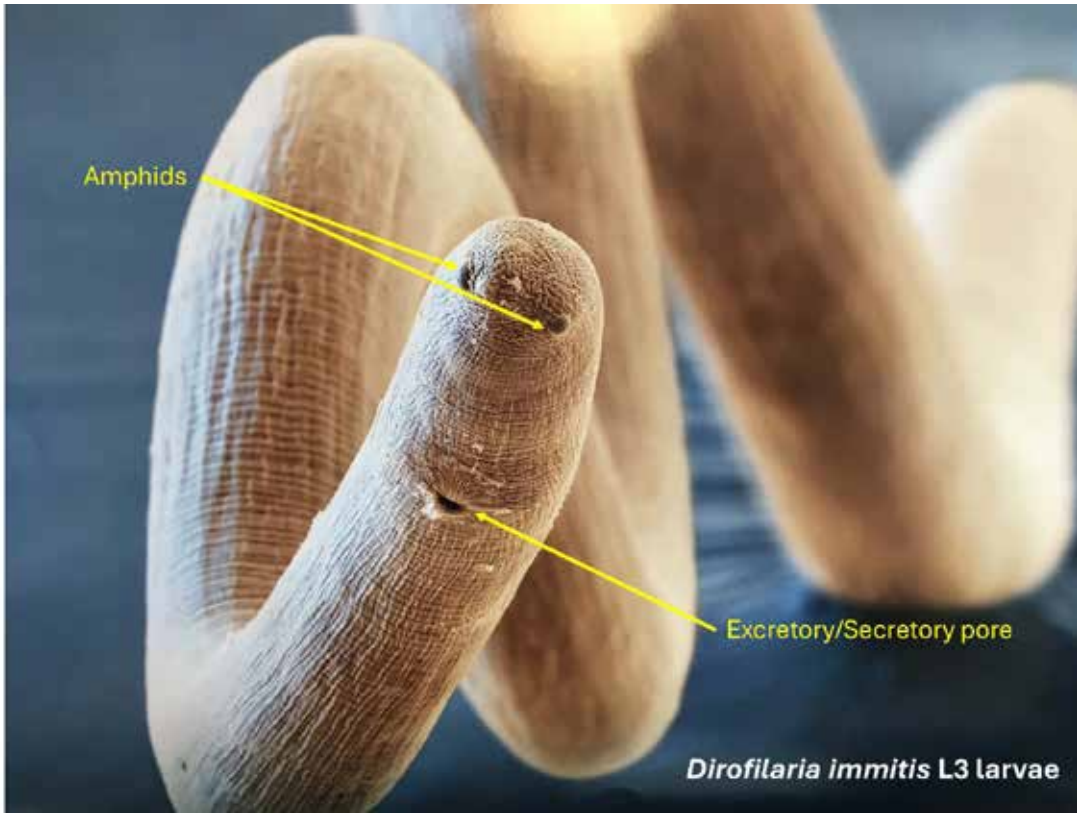

Image courtesy Roger Prichard

appears in part to be due to strains of D. immitis that are resistant to MLs.

Dogs are part of the family in many households and increasing mobility of people means that dogs also get relocated around the world when their owner move. Furthermore, many people want to care for and adopt a dog in a shelter and bring the joy of owning a dog into their family. This can also lead to dogs being transported around the world; and with them their parasites, including *D. immitis*, possibly resistant to MLs, also may be relocated.

Adult heartworm infections can usually be detected by an antigen test or by microscopic detection of the early L1 larval stage, the microfilariae, in dog blood (Knotts test). However, neither of these types of tests detects the developing larval stages, from the L3 stage transmitted by an infected mosquito, to the L4 and L5 (juvenile adults); they only detect infection once the adults are mature and able to reproduce. Thus, even if veterinary tests are made on a dog before it is relocated, immature worms may not be detected and may mature and produce microfilariae in the new location. If the worms are of a resistant strain, their progeny may be picked up by mosquitoes and a ML resistant strain introduced in a new location – spreading resistance. In addition, the continuous reliance on a single class of heartworm preventive, the MLs, over several decades, could select for resistance de novo. There is a need for new, non-ML, class(es) of anthelmintics that can prevent heartworm infection.

LJ: How should we monitor and reduce the spread of resistant D. immitis?

RP: Monitoring for ML-resistance in *D. immitis* is challenging as the heartworm preventives stop adult worms from developing by killing the L3/L4 larval stages in the dog. We do not have tools to detect these larval stages and it takes 6 – 9 months for the L3 larvae to develop to adults, making prevention of development difficult and expensive to monitor. Furthermore, retrospective attribution of an infection to ML-resistance relies on confirmation of administration by the owner in strict compliance with

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Drugs and Drug Resistance

the normal 30-day frequency for the preventive medication. This is difficult to confirm. Because of these difficulties, two other approaches have been developed to assess possible resistance. Genetic tests have been developed which monitor the frequency of single nucleotide polymorphisms (SNPs) associated with resistance (but not necessarily causative). This method is suitable for rapid monitoring for resistance in individual dogs, or for large-scale surveys, with the microfilarial stage in the blood. In addition, a microfilarial suppression test (MFST) can be conducted. This involves estimating the microfilarial load in a blood sample from an infected dog (a microscopic examination and count), then treating the dog with a microfilaricidal dose of a ML (moxidectin in high dose formulations have been registered in some jurisdictions as microfilaricidal), and then approximately 4 weeks later taking another blood sample for a microfilaria count. A reduction of less than 90% in microfilarial load is considered evidence of ML resistance. The SNP test and the MFST can be complimentary, indicating both genetic and phenotypic evidence of resistance. Despite the availability of these tests on the microfilarial stage, we lack a simple means to detect and monitor resistance while the parasite is still at the L3/L4 stages in the dog.

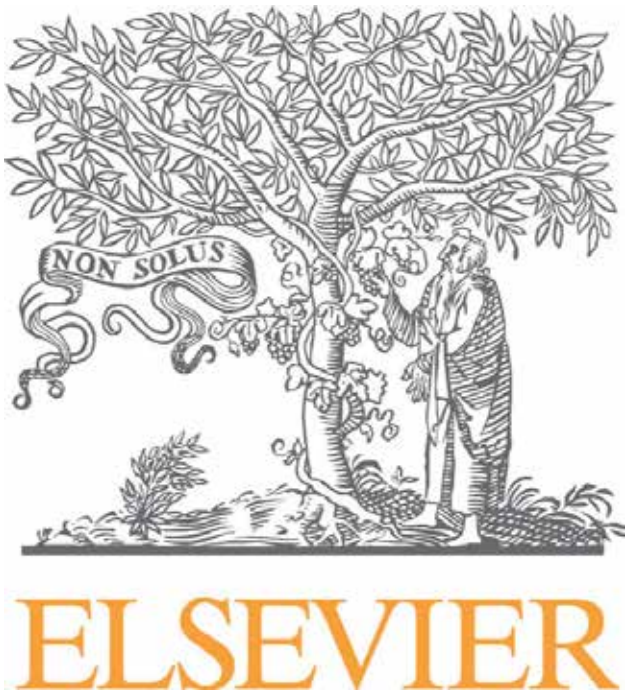
Nevertheless, relocation of a dog from a region where ML resistance occurs runs the risk of introducing resistant heartworms. As a first precaution a dog for relocation should be assessed by the antigen test and a blood examination for *D. immitis* microfilaria. However, as these tests only detect an adult parasite infection, a dog should be kept in a mosquito screened quarantine facility for 9 months and tested for infection and resistance before release into its new environment. That is an onerous and expensive requirement.

LJ: Tell us what will be the next stage of your research?

RP: My research on heartworm is now focussed on (1) improving the genetic tests for ML resistance, including understanding the precise mechanisms and genetics of ML resistance, and (2) finding non-macrocyclic lactone medications that can interfere with the development of the larval stages of *D. immitis* and prevent establishment of the adult parasites which cause the severe pathology.

As *D. immitis* is a filarial nematode, research on these problems is also relevant for improving control of other filarial infections which affect humans, such as Onchocerciasis (River blindness) and Lymphatic Filariasis (Elephantiasis). These human diseases have also been an important aspect of my research in Developing Countries.

LJ: Thanks Roger for your insightful interview!



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CAUL AGREEMENT NOTICE

Just a reminder of the CAUL Agreement for waiver of IJP article processing charges, and discounted APC's for IJP-PAW and IJP-DDR, for ASP members at participating Australian and New Zealand institutions.

See here for details:

https://www.elsevier.com/open-access/agreements/caul-consortium?utm_campaign=STMJ_216464_STMJIN_OA&utm_medium=email&utm_acid=80425919&SIS_ID=&dgcid=STMJ_216464_STMJIN_OA&CMX_ID=&utm_in=DM451951&utm_source=AC_

DISCOUNTED PUBLICATION RATES

Don't forget there are discounted rates for ASP members to publish as Open Access in Elsevier Journals IJP, IJPPAW and IJPDDR and also for One-Health.

The discounted rate for IFTM affiliated Society (members) is https://www.sciencedirect.com/journal/one-health/publish/open-access-options

ASP Researcher Exchange, Travel and Training and JD Smyth Postgraduate Student Travel Funding Scheme, Mentorship scheme, Honours and Grant Recipients and 2025 ASP Conference

ASP Researcher Exchange, Travel and Training Funding Scheme

Congratulations to the ASP Researcher Exchange, Travel and Training and JD Smyth Postgraduate Student Travel awardees from the March 2024 funding round.

The next deadline for applications is 30th March 2025.

JD Smyth Postgraduate Travel Award winner

Patrick Kumbategire TUMWEBAZE, PhD Candidate, Griiffith University for a Researcher Exchange Researcher Exchange to visit Prof Philip Rosenthal, University of California, San Francisco, USA Approximately from 1st - 31st August 2024 for Analysis of clinical *P. falciparum* isolates from Uganda.

Researcher Exchange, Travel and Training Award winners

Miss Melissa Jayne Carabott – PhD Candidate RMIT for a Researcher Exchange Researcher Exchange to visit Assoc. Prof. Sho Shirakashi, Kindai University, Aquaculture Research Institute in Japan Sunday, July 7, 2024 to Sunday, August 18, 2024 (6 weeks). The objective of travel will be to further validate recombinase polymerase assay coupled with a lateral flow (RPA-LF) to determine the infection pattern of blood flukes, *Cardicola forsteri* and *C. orientalis* in the first few weeks post-transfer in farmed Pacific bluefin tuna (Thunnus orientalis, PBT).

Ms Jemma Hudson, PhD candidate RMIT for a Researcher Exchange Researcher Exchange to visit Assoc. Prof. Sho Shirakashi, Kindai University, Aquaculture Research Institute in Japan Sunday, July 7, 2024 to Sunday, August 18, 2024 (6 weeks) to conduct field work in Japan, collecting samples of parasites from Pacific bluefin tuna to collect and study the cercaria, egg and adult life stages of *C. orientalis* and *C. forsteri* in PBT and conduct transcriptomic and glycomic research.

Dr Mukund Madhav (CERC Fellow), Australian Centre for disease preparedness, CSIRO to attend the intensive eight-day Synthetic Biology Workshop at the EMBL Advanced Training Centre 15-22 September 2024.

Previous award was resubmitted due to location change:

Sai Lekkala, Research Assistant (Tonkin/ McCarthy labs) WEHI for a Researcher Exchange Researcher Exchange to visit Asst. Prof. Amandine Guerin's laboratory at The University of Geneva 25th April – 8th May, 2024 (2 weeks) to learn Cryptosporidium culturing and purification techniques and also to visit Prof. Dominique Soldati, The University of Geneva, to learn 'Iterative Ultrastructure Expansion Microscopy' (iU-ExM), the latest methods in Expansion Microscopy.

Funding Assistance is available to members of the ASP for Researcher Exchanges, Training Courses, Visiting International Lectureships, Workshops and Grant Writing Retreats.

The ASP aims to: promote and facilitate interaction between colleagues, peers and potential research partners; communicate the scientific achievements of its members; and create professional development opportunities for them, in particular for postgraduate students and early career postdoctoral fellows. Therefore, the ASP provides funding assistance for its members to undertake important, relevant travel. This may include exchanges between laboratories (ranging from a few weeks up to a year); or training courses (like the annual Biology of Parasitism Course at Woods Hole); or to finance lecture tours by esteemed international scientists; or to organise and host workshops and/or grant writing retreats that promote or foster significant collaboration between ASP members (e.g. for NHMRC Programs, ARC Centres of Excellence and other large scale research undertakings). This funding scheme does not support travel to attend conferences, with the exception of the JD Smyth Postgraduate Student Travel Award.

JD Smyth Postgraduate Student Travel Award

Financial assistance is to be provided to full-time postgraduate student members of at least 6 months standing who are enrolled at a recognised Australian University for the purpose of travelling overseas to gain knowledge on techniques that may not be available in Australia, to form liaisons that may benefit their careers in the longer term and to promote the cause of parasitology in Australia. The fellowship is not provided for the primary purpose of attending a conference. The maximum value of the fellowship is to be determined annually by the Council. Recipients are to be chosen by a selection committee appointed by Council.

Applications should include details of the travel to be undertaken, the applicants research, evidence of the supervisor's support and an abbreviated CV. If attendance at a conference is to form part of the travel then a copy of the conference abstract should also be included. The application must include a CV.

Closing dates

ASP Fellowships
1 January 2025

ASP Researcher Exchange, Travel and Training Awards & JD Smyth
30 March 2025

John Frederick Adrian Sprent Prize
30 September 2025

Bancroft-Mackerras Medal for Excellence
30 September 2025

More information
www.parasite.org.au

Awardees will be required to provide a report of their trip within three months of return from their travel.

https://www.parasite.org.au/awards/jd-smyth-postgraduate-travel-awards/

Network Mentorship Scheme

Network Mentorship Scheme Early career researchers are encouraged to apply to the Network Convenor (nick.smith@parasite.org.au), in strict confidence, for funding to participate in the Network Mentorship Scheme. The scheme allows researchers to be paired with experienced, successful academics to discuss, plan, prioritise and set targets for their career. Arrangements for professional development and progress to be reviewed by the pair annually. Importantly, mentors need not be from an individual's home institution. The scheme covers mentorship across all aspects of working in parasitology including research, teaching, leadership, communication and outreach and other areas of professional development.

Kings Birthday Honours

Congratulations to Professor Una Ryan (AM) - Member of the Order of Australia for significant service to tertiary education, to biochemistry, and to parasitology.

Congratulations to Professor Ross Coppel (AO) - Officer of the Order of Australia for distinguished service to science as a microbiologist, to tertiary education, to board and advisory roles, and to innovation.

Congratulations to recent NHMRC grant recipients

Dr Danny Wilson, The University of Adelaide, $1,061,015 over 4 years for a project to investigate: Apicomplexan parasites of humans and livestock, including malaria, survive by infecting and reproducing in host-cells. To enable host-cell entry, these parasites evolved sets of unique and shared proteins whose functions remain unknown. Using a multi-disciplinary approach, this project will define cross-species protein function of malaria proteins required for early and late stages of host-cell entry. Leveraging a substantial international network of research partners, outcomes of benefit to Australia include establishing a lead role in understanding the protein network driving different stages of malaria host-cell entry, characterisation of potential therapeutic targets and advancing imaging techniques applicable to other cellular systems.

Congratulations to parasitologists who've recently been awarded NHMRC Investigator Grants

Assoc Prof Kamala Ley-Thriemer, Optimising radical cure for *vivax* malaria to accelerate malaria elimination Menzies School of Health Research $2,360,416

My vision is to contribute to global malaria elimination efforts. I will do this through an international clinical trials program across six countries testing new treatment regimens for *vivax* malaria. I will also use qualitative methods to design how those new treatment strategies can be implemented and will work directly with national malaria control programs to facilitate that research findings are translated into practice.

Prof James Beeson, New pathways to achieve highly protective and long-lasting malaria vaccines, Burnet Institute, $2,981,630

This program will advance the development of highly potent and durable malaria vaccines through novel and innovative techniques to identify crucial targets for protective immunity against malaria. We will determine the reasons behind short-lived immunity and develop strategies for new vaccines that offer long-lasting protection with sustained effectiveness. These objectives will be supported by complementary vaccine development and translational activities for new approaches to malaria vaccines.

Prof Miles Davenport, Translational Analytics: Integrating experimental and clinical data to understand vaccination and immunity, University of New South Wales, $2,981,630

Experimental methods have advanced rapidly to improve our understanding of infection and immunity. However, we need novel analytical approaches to incorporate pre-clinical studies to provide evidence-based guidance for the development and clinical use of vaccines and therapeutics. Translational analytics uses quantitative, interdisciplinary, collaborative approaches to harness the power of experimental data to inform policy and practice in treatment and control of infectious diseases.

Prof Alan Cowman, Malaria and development of new antimalarials, The Walter and Eliza Hall Institute of Medical Research, $2,981,630

Malaria is a major disease of humans that kills >630,000 people each year. The treatment and control of malaria is being threatened by the ability of the infectious agent to develop resistance to current antimalarials. Overall, this program will develop new antimalarials with a high barrier for resistance and provide novel insights into the fundamental biology of ubiquitin in *P. falciparum* and adapt this knowledge for new therapies that mitigate emergence of drug resistance in malaria.

2025 ASP Annual Conference

We hope you enjoyed Parasites in the Pacific 2024 conference in Auckland in August.

Next year the ASP Annual Conference will take place from the evening of Monday 30th June - Thursday 3rd July 2025 at Melbourne Connect, Melbourne, Victoria. We hope to see you all there! More details coming soon.

With best wishes,

Nick and Lisa

www.youtube.com/user/ASPParasiteNetwork
www.parasite.org.au
www.facebook.com/ASParasitology
www.twitter.com/AS_Para

ASP Researcher Exchange, Travel and Training and JD Smyth Postgraduate Student Travel Funding Scheme reports

ASP Travel Award – Japan Trip Travel Report

I. Name of researcher(s)

Melissa Carabott, RMIT (travelled alongside Jemma Hudson, RMIT)

II. Any outcomes linked to the program (e.g., publications, professional reports, new collaborations or new lines of inquiry resulting from the program, grant applications, new skills developed etc);

The trip to visit and collect samples from Research Stations operated by Kindai University in Japan was highly successful. I was able to collect samples from Pacific Bluefin Tuna at both Oshima and Amami Island research stations as planned, sampling from 51 Pacific Bluefin Tuna across a range of ages. The samples collected are the focus of an upcoming paper / PhD thesis chapter in collaboration with A/Prof Sho Shirakashi on the application of the point-of-care diagnostic method (RPA-LF) as well as non-lethal sampling and dipstick DNA extraction to detect blood flukes of the genus Cardicola in Pacific Bluefin Tuna. This paper will include A/Prof Sho Shirakashi as well as other colleagues across Kindai University Research Stations as co-authors.

Being based at Shirahama Station provided the opportunity to observe how their facilities raise and maintain hatchery-reared fish, seeing the fish from eggs to around 4 years-of-age. Their facilities are not only home to Pacific Bluefin Tuna, but other fish species such as Japanese flounder, Greater amberjack and kelp grouper. I assisted in their daily routines of maintain fish for experiments, which included feeding, repairing, and cleaning tanks. I also had the opportunity to observe and assist with ongoing experiments in the lab. This included assisting with cercariae infection trials and conducting biopsies on fish as well as observing the process of identifying potential new parasitic species. Being able to be so involved in the day-to-day operation enabled me to easily network with people across the University's facilities.

During our visit to Japan, Jemma and I were fortunate to visit the Shiga Prefectural Fisheries Experiment Station operated by University of Shiga Prefecture in Hikone. While we were there, we toured the facility and learned about the parasites affecting fish and other species inhabiting Lake Biwa. With 62 confirmed endemic species and 84 suspected endemic species, the work conducted by the facility focuses on the protection of species within the lake. During our visit, we also observed A/Prof Sho Shirakashi set up a new experiment with his colleagues Assistant Professor Ryuhei Kinami and Dr Kazuhiro Sugahara.

Jemma and I were also fortunate to visit A/Prof Sho Shirakashi's PhD supervisor, Prof Kazuo Ogawa of Meguro Parasitological Museum, Tokyo. I really enjoyed meeting and learning from Prof Ogawa. He spoke to us about the history of the museum and showed us their collections including slides and drawings from his supervisor's research, Prof Satyu Yamaguti.

My experience in Japan exceeded all my expectations, in terms of the sampling I was able to conduct, learning opportunities and the connections I made. The exchange not only allowed me to improve and develop new lab-based skills but also enhanced my ability to collaborate with new teams ultimately contribution to upcoming publications on this work. It was a highly valuable learning experience that I'm sure would be difficult to replicate elsewhere.

Australian Society for Parasitology, Student Travel Award: Travel Report

I. Name of researcher(s)

Jemma Hudson, RMIT (travel was undertaken alongside Melissa Carabott, RMIT)

II. Outcomes

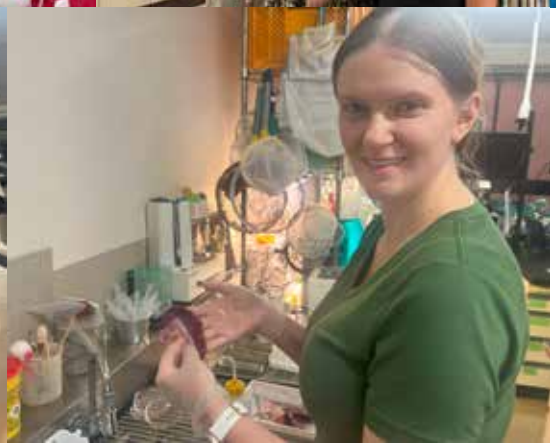
For 6 weeks from July-August I, together with Melissa Carabott (RMIT), was able to travel to visit Kindai University in Shirahama, Japan, hosted by A/Prof Sho Shirakashi. During this trip, I was fortunate to be able to visit two of their aquaculture facilities: Oshima station and Amami station, where I collected samples of three species of blood fluke – *Cardicola orientalis, C. forsteri,* and *C. opisthorchis* - from Pacific bluefin tuna. These samples will be used to complete several chapters of my PhD, in genomic, transcriptomic, and glycomic analyses, to improve our understanding of this group of blood flukes. An exposure experiment was also conducted on a subset of samples collected, exposing live C. opisthorchis to the anthelmintic drug praziquantel, to examine the transcriptomic response of the flukes. Several papers should result from the collection of these samples and will include A/Prof Sho Shirakashi and other colleagues from Kindai University as authors. As planned, searches were also conducted for the polychaete intermediate hosts of these parasites, however despite thorough investigating, no infected polychaetes were found. This provides an interesting insight into the levels of infection surrounding the tuna cages. The number and variety of adult flukes collected however, provides the opportunity to conduct a significant amount of research and will lead to many positive outcomes as a result of this trip.

During the stay at Kindai University, I was able to participate in the research being done by the students and staff within the fish disease lab. I was able gain experience conducting biopsies on a variety of fish species, and to improve my skills in identifying and collecting a diverse range of parasites. I was also able to be immersed in the lab, participating in the maintenance of the aquaculture facilities, observing, and helping with experiments run by the students, and learning new techniques. It was highly valuable to get this experience, which simultaneously allowed me to meet and learn from the students and staff at Kindai University. The trip allowed me to form positive relationships with established and emerging researchers within this field, which will hopefully continue into future collaborations.

This trip also provided me the opportunity to visit several research stations, to learn about the research being conducted. At both Oshima and Amami stations, I was able to tour the facilities and learn about the hatchery rearing processes for the fish being farmed. Melissa and I were also able to visit Shiga Prefectural Fisheries Experiment Station in Hikone and learn about

ASP Researcher Exchange, Travel and Training and JD Smyth Postgraduate Student Travel Funding Scheme reports

the parasites affecting fish and other species in Lake Biwa. Near the end of our trip, Melissa and I had the opportunity to visit the Meguro Parasitological Museum, in Tokyo, where we were able to meet Prof. Kazuo Ogawa, who gave us a tour of the collections there, and taught us about the processes involved in collecting museum specimens and making taxonomic drawings of parasites. Overall, this travel exchange provided me with highly valuable learning and research opportunities that will improve my skills as a parasitologist and lead to the output of several papers.



Photos (L-R from top) Feeding fish at Shirahama Station, Kindai University (L-R Jemma Hudson; Melissa Carabott); Melissa dissecting juvenile Pacific Bluefin Tuna mucus; Visit to Meguro Parasite Museum, Tokyo (Melissa Carabott); Visit to Meguro Parasite Museum, Tokyo ([L-R Prof Ogawa; Jemma Hudson; Melissa Carabott); Sampling at Amami Island Station (L-R Jemma Hudson; Melissa Carabott; A/Prof Nathan Bott); Jemma Hudson and Melissa Carabott collecting samples at Oshima station; Jemma Hudson observing some of the parasites studied at Kindai University, Shirahama; Jemma Hudson collecting parasites from Pacific bluefin tuna gills

State News

WA

Murdoch University

2024 King's Birthday Honours
Congratulations to **Professor Una Ryan**, Professor in Biochemistry in the School of Agricultural Sciences, who was appointed a Member (AM) of the Order of Australia for significant service to tertiary education, biochemistry and parasitology. She is an exceptional leader and mentor both within the University and in the wider parasitology community and has made outstanding contributions to science locally and more widely.

Andrew Larkins, Wenna Lee and Samantha Gunasekera have all completed their PhD's and are due to graduate later this month at Murdoch University.

Victoria

State Outreach event

We had a really good turn out from Fed Uni, and Melbourne Uni – Stuart's group at Bio21 and the Gasser/Colella labs. There were a few honours students keen to join the society and attend the ASP conference in Auckland Overall, a very nice time had by all!

University of Melbourne

A huge congratulations to **Dr Vito Colella** who has recently taken on a continuing role in the University of Melbourne's Veterinary School as a Senior Lecturer in One Health and Veterinary and Medical Parasitology. Within this position he will continue his research as the head of the Translational Research in Parasitology Group (TRiP), investigating the development of novel diagnostics and intervention strategies to mitigate the impact of zoonotic parasites on human and animal populations in the Asia-Pacific and beyond.

The TRiP Group has more successes to celebrate with the recent PhD theses submissions of **Patsy Zendejas and Ushani Atapattu. Patsy**, supervised by **Dr Vito Colella, Dr Shannon Hedtke and Prof Warwick Grant,** completed her PhD on the harnessing of molecular tools for the control of zoonotic soil-transmitted helminths. She finalised her PhD with an impressive 16 publications and numerous fantastic memories filled with fieldwork spent collecting canine faecal samples from across Cambodia. **Ushani,** supervised by **Dr Vito Colella, Dr Anke Wietholter and Prof Rebecca Traub** has completed her PhD on elucidating the epidemiology of canine vector-borne pathogens and their geoclimatic and socioeconomic determinants in Sri Lanka and Australia. Despite a difficult start to her PhD getting stuck in Sri Lanka during Australia's strict COVID-19 restrictions she has overcome such challenges to generate a fascinating thesis identifying novel vector-borne pathogens in Sri Lanka, many of which are zoonotic and may be responsible for reemerging filariases in this nation.

An additional congratulations to **Thi Thuy Nguyen** supervised by **Dr Vito Colella, Dr Lucas Huggins, Prof. Robin Gasser and Prof. Gad Baneth** for passing her PhD confirmation in May. She gave a fascinating talk on her research exploring the use of nanopore sequencing to develop highly sensitive and specific diagnostic tools to characterise Leishmania diversity from canines, humans and other animals.

During the first half of this year the TRiP lab also welcomed a new intern, **María Camila García Guerra**, from the National Autonomous University of Mexico. Camila is doing her masters degree on the genetic diversity of *Toxoplasma gondii* in free roaming cats found in the Valley of Mexico. Camila has been working in the TRiP lab for five months learning about the team's research using molecular techniques, nanopore sequencing and bioinformatics to aid in the accurate genotyping of *Toxoplasma*. About her experience Camila said:

"I am so grateful and happy to have had the opportunity to come to the University of Melbourne and be part of the TRiP parasitology group. During my internship I learned from each one of the members of the group, all of them are amazing in what they do, they were really kind and open to answer all my questions and teach me and explain the different techniques. It was really interesting and enriching for me to be able to compare DNA extraction, DNA quantification, PCR and qPCR protocols between those I was using in Mexico and those that are used here. I also got to learn about Nanopore sequencing, which is not a common technique in Mexico. I improved my skills in bioinformatics and I took home many new tips about how to afront and deal with unexpected results and failed experiments. It was really enriching to be able to talk to all the members of the group and receive some new ideas on how to proceed with my experiments. Finally, being here opened my mind about everything is possible to be done using the molecular techniques to contribute to the diagnostic and epidemiology of zoonotic parasites"

Earlier in the year the TRiP Lab also hosted **Natalie Jefferson** one of a limited few selected to participate in the Amgen Scholar Fellowship, a prestigious undergraduate research program in science and biotechnology offered by top ranking universities worldwide. Natalie, an Honours student from Charles Sturt University supervised by **Prof Shokoofeh Shamsi**, received training in techniques used to investigate One Health approaches to feline medicine and became acquainted with cutting-edge tools used for diagnostics within the TRiP lab.

Also, within the University of Melbourne Veterinary School **Dr Clare Anstead** has begun work alongside **Dr Shilpa Kapoor** and **A/Prof Aaron Jex** on a chromosomal level genome assembly for the Australian sheep blowfly, *Lucilia cuprina dorsalis*. Across this project they will be employing an integrated genomics approach that combines Oxford Nanopore Technologies (ONT) and Illumina sequencing with high-throughput chromosomal conformation capture sequencing (Hi-C). This comprehensive assembly will provide valuable insights into the genetic composition, evolutionary history, and mechanisms underlying key biological processes in *L. c. dorsalis*. Their recent publication on the mitochondrial genome for this species is also out:

State News continued

Complete Mitochondrial Genome for *Lucilia cuprina dorsalis* (Diptera: Calliphoridae) from the Northern Territory, Australia. **Shilpa Kapoor, Ying Ting Yang, Robyn Hall, Robin Gasser, Vernon Bowles, Trent Perry, Clare Anstead.** Genes, 2024;15(4):506. doi: 10.3390/genes15040506

Clare has also recently received funding from Australian Wool Innovation for the identification of novel targets against the sheep blowfly alongside chief-investigators **A/Prof Aaron Jex, A/Prof Vernon Bowles and Dr Simon Baxter. Gothami Wilikadage** will be leading this research.

The Gasser Lab recently welcomed **Dr Belén González Bertolín** in May to do a project on the analysis and interpretation of the genome of the nematode parasite *Gnathostoma spinigerum*.

Belen completed her studies in pharmacy in Madrid, Spain, and subsequently undertook a master's degree in bioinformatics. She then commenced her doctoral thesis at the Instituto de Salud Carlos III and successfully completed this last January with the defence of her thesis. Her doctoral project was focused on the search and validation of recombinant antigens for the serological diagnosis of various helminth diseases, including loiasis, neurocysticercosis, and hydatidosis. Furthermore, she initiated a project for the de novo sequencing and assembly of the nematode parasite *Gnathostoma spinigerum*, which causes eosinophilic meningitis in humans. Now during her time within the Gasser laboratory, she is developing her skills and gaining invaluable insights into the bioinformatics analysis of helminth genomes. Belen said "I am particularly grateful for the opportunity to work alongside leading experts in the field of veterinary bioscience, as part of Robin Gasser's research team, with **Dr Neil Young** being a particular source of guidance. I am excited to continue this journey and valuable learning experience at the University of Melbourne."

Finally, the TRiP Lab in conjunction with the wider University of Melbourne Parasitology Team hosted **A/Profs Christopher Fernandez Prada (University of Montreal) and David Langlais (McGill University)** who visited to establish a One Health research agenda between Australia and Canada, whilst also both giving enlightening talks on their current research programs. In addition, **Elma Nate** from the Papua New Guinea Institute of Medical Research has also visited this team and will be conducting research with them as a part of an NHMRC-funded Centre of Research Excellence project with the Australian Centre for Control and Elimination of Neglected Tropical Diseases.

QLD

QIMR Berghofer MRI

News from **Darren Gray** and **Catherine Gordon's** team.

Eliminating *S. mekongi* – the final push.

We were lucky enough to receive an eASIA and NHMRC joint research program grant to develop interventions against Schistosoma mekongi and model potential impacts of climate change on transmission dynamics in Laos and Cambodia. This cooperative research project aims to eliminate Schistosoma mekongi in Lao PDR and Cambodia by using an intensive multi-component "One Health" approach. Climate prediction models show that the Mekong region will be significantly impacted by climate change leading to extending transmission season of *S. mekongi,* as well as shifting or expanding habitats. Thus, now is the critical time to eliminate *S. mekongi* before the effects of climate change are felt. We started the project this year with a great workshop in Vientiane, Lao PDR and hope to begin field work soon. During the workshop we met the local health workers and members of different health, engineering, and education departments who all play an important role in *S. mekongi* control.

Just prior to the workshop we also attended Mahidol University, in Thailand, and one of our partners in the project. There we were thrilled to view the snail aquariums they have for *Schistosoma* spp. lifecycle maintenance and compare notes to our own snail aquarium setup.

Listen to their Podcast https://www.qimrberghofer.edu.au/news/bodylab-podcast/new-project-to-eliminate-deadly-neglected-tropical-disease/

Request for soil or water samples from Catherine Gordon

Dear ASP members,

We are currently undertaking to test Strongyloides qPCR primers for species specificity. We believe there is already a good candidate primer set available but we need to ideally test them with a range of soil and animal, particularly wildlife, nematodes.

Thus, if you have any soil or water samples (or DNA from these sources) which may contain soil nematodes, or nematode samples or DNA from wildlife, that you would be willing to provide we would be most grateful.

If you have any of these samples please contact either myself (Catherine.Gordon[at]qimrberghofer) or Richard (richard.bradbury[at]jcu.edu.au).

Thanks,

Catherine

Catherine Gordon, Senior Research Officer

Darren Gray and Catherine Gordon visiting Laos, Cambodia and Thailand to eliminate *Schistosoma mekongi*

State News continued

Darren Gray and Catherine Gordon visiting Laos, Cambodia and Thailand to eliminate *Schistosoma mekongi*

State News continued

QIMR Berghofer Medical Research Institute

NSW

University of Sydney

Veterinary Parasitology @ University of Sydney

Time flies, and the parasitology group at the Sydney School of Veterinary Science has successfully completed Semester 1 teaching. We welcome our new lecturer, **Dr. Emily Francis**, who will be teaching with us for the next three years while **Dr. Nichola Calvani i**s on a research-only DECRA fellowship.

Dr. **Emily Francis** is not unknown to us; she is our former PhD student. Congratulations to Emily, who successfully defended her thesis and presented her exit seminar in June. Emily's expertise in ruminant parasitology and her industry connections, particularly her 'nemabiome' knowledge, were highly regarded by her assessors. We voted Emily's last paper the best so far: "The proof is in the poo-ding: Benefits of longitudinal molecular surveillance of drug resistance demonstrated in a New South Wales cattle herd." You can read it here: https://doi.org/10.1016/j.vetpar.2024.110145 We eagerly anticipate Emily's continuation of this research in the next chapter of her professional career.

Our two PhD students, **Rose Power** and **Phoebe Rivory,** are completing and writing up their theses on canine heartworm and rat lungworm, respectively. Stay tuned; there's definitely some nice and unexpected surprises coming!

Meanwhile, our Master's student, **Thomas Stocker**, has been busy applying his understanding of hookworms and mining existing NGS data to enhance his skill set. He reanalysed published PLoS Pathogen data focused on *Ancylostoma caninum*, from the data he defining the distribution and benzimidazole susceptibility of all non-*A. caninum* hookworms that the authors left for others to dig through. You can read his work here: https://doi.org/10.1016/j.vetpar.2024.110118.

Jan's Honours students, **Ariel Chen and Crystal Elliott,** are becoming proficient in genotyping dolphin *Toxoplasma gondii* cases and characterising levamisole markers in Trichostrongylus, respectively. Nichola's Honours student **Chelsie Uthayakumar,** along with a placement student **Priscilla Huynh, Nichola and Emily**, spent a week in the field in early July collecting samples for Chelsie's honours project on drug resistant Fasciola hepatica. They had a wonderful time interacting with farmers and their livestock, with **Chelsie and Priscilla** gaining some valuable hands-on experience. They are looking forward to returning in two weeks' time with **Dr. Tanapan Sukee** from A/Prof. Neil Young's group at The University of Melbourne. Nichola's other Honours student, **Sean Burhop**, has been learning cell culture as part of Nichola's DECRA project to continue developing and streamlining 3D cell culture models for helminth invasion, migration, and development in their mammalian hosts. Lastly, Nichola's DVM3 Research and Enquiry student, **Simran (Simmy) Vyas** has been busy analysing liver fluke distribution data, with some long-overdue updates for producers coming soon!

Prof Jan Šlapeta is the recipient of the 2024 Ian Clunies Ross Award for his significant contributions to veterinary research, as recognised by The Australian and New Zealand College of Veterinary Scientists. Congratulations Jan!

Recently, the University of Sydney's Veterinary School hosted the ASID Zoonoses 2024 conference, titled 'Crossroads of Contagion' (https://asid.net.au/zoo2024). During the conference, Jan represented parasitology through an invited talk on rat lungworm in Australia and the disease it causes in both humans and dogs.

Veterinary Parasitology group at University of Sydney

State News continued

Finally, the group enjoyed a bit of ice skating at Bondi.

TASMANIA

Tasmanian State News

Thank you to **Nick Fountain-Jones** (University of Tasmania) for his inspiring service as Tasmanian Council Representative for the past term. **Kate Hutson** (Cawthron Institute) was elected to the position at the last ASP AGM in Auckland and is looking forward to working with ASP members locally and nationally. Tasmania welcomes new member **Robyn Weeding**. Robyn began working life at 16 as a vet nurse in a mixed species centre where she I honed into the fascination of parasites. She combined parenting with university studies in Health Science Nursing and was a member of Royal Australian Army Nursing Corps for four years. Her love of animals, especially horses, saw her entry into CSU's Equine Science course part time. She has completed UQ's GradCert Animal Sci (Wildlife Biology) and is currently enrolled in their Master's programme. Robyn's hobbies include rescue and rehabilitation of Tasmanian wildlife.

Nick is leading a Tasmanian One-Health collective with engagement across medical, state government, academic and independent organisations and involves fellow ASP members **Barbara Nowak** and **Kate**. As part of this initiative Nick and collaborators have come together at multiple fora to consider islands and their role in understanding ecological and evolutionary processes that shape human, animal and environmental health. The team's paper – 'One health on islands: tractable ecosystems to explore the nexus between human, animal, terrestrial and marine health' was recently accepted in *BioScience*.

During her trip to Europe in May, **Barbara** (University of Tasmania) gave invited lectures, including "Aquatic amoebae - a challenge to fish health professionals" at the Bern University, Bern, Switzerland and "Researching immune response in fish – issues with sampling and histology" at Jagiellonian University, Cracov, Poland. She was teaching in a workshop on "Fish as experimental animals - zebrafish CRISPR and in vivo imaging" at University of Copenhagen, Denmark.

As a member of International Committee of ISFP, Barbara has been contributing to organization and promoting the next Symposium which will take place on 20-24 January 2025 in Merida, Mexico, please see https://isfpxi.com/ for more information.

Kate (Cawthron Institute) and **Jonah Yick** (Inland Fisheries Service, Tasmania) are working together to understand the diseases of the pouched lamprey, *Geotria australis*, as part of a New Zealand based research programme, *Emerging Aquatic Diseases*. They recently welcomed visiting postdoctoral fellow, **Jerusha Bennett** (University of Otago) to Hobart – fresh off the back of Jerusha's attendance at ASP/NZSP in Auckland and the Trematodes Conference in Brisbane – to help with a survey of lamprey parasites.

Lamprey themselves are marine parasites and feed on other aquatic animals. In New Zealand, lamprey *Geotria australis* (kanakana) are susceptible to "lamprey reddening syndrome" which typically causes skin abnormalities around the gills, bodies and fins and has been associated with morbidity and mortality of lamprey returning to freshwater to spawn. The species comprises an important customary fishery for Māori and is considered a taonga (treasured) species, however, lamprey populations have diminished, and the species is listed *Threatened – Nationally Vulnerable*. Outbreaks of lamprey reddening syndrome have occurred in NZ since 2011. A similar haemorrhagic skin condition was previously reported on *G. australis* in Western Australia in the late 1970s, but the extent of the disease in Australia is currently unknown. In Tasmania, observation and counts of lamprey in the River Derwent by the Inland Fisheries Service (IFS) indicates a robust and healthy population.

Despite disease investigations into mortality events in NZ and recent research efforts, the cause of lamprey reddening syndrome remains unknown. The Tasmanian lamprey population provides a unique opportunity to better understand lamprey diseases and comparison with the NZ population can help identify differences between presumably healthy and diseased populations. The team organised a baseline survey of lamprey from the River Derwent in Tasmania. Here, the IFS monitor a fish trap to enable fish moving upstream to navigate past the Meadowbank Power Station (hydroelectric power). Fortunately, the evening prior to sampling, more than 200kg of lamprey had run up the river and were in the trap. A representative sample of presumably healthy individuals were used to establish a baseline understanding of bacterial, viral, fungal, and parasitic fauna using a combination of traditional and molecular techniques. Parasites found included leeches, cestodes, nematodes and trematodes – most which are new host records.

NEWS

CiP2024 participants

Congratulations to **Kai Hänggeli** (PhD candidate; supervisor: Prof. Andrew Hemphill; https://www.ipa.vetsuisse.unibe.ch/about_us/personen/haenggeli_kai/index_eng.html) from the Institute of Parasitology in Bern has received an award (https://www.sstmp.ch/robin-b-gasser-award-for-early-career-academics) to attend the CIP course and will spend some time meeting people in Australia.

Congratulations to **Vinoth Rajendran** and **Atefeh Fath**i who were selected for an Australian Society of Parasitology-funded place on the 2024 Concepts in Parasitology course. This funding scheme is part of the Elsevier and IJP Disadvantaged Researcher Scheme.

State News continued

Images from top: Jonah, Kate and Jerusha at Meadowbank where Inland Fisheries enable lamprey and other fish movements upstream.(Tasmania news)
Images (L-R) Lamprey (a parasitic fish) attached to glass showing mouth parts which are used to feed on other marine animals. They move into freshwater rivers to mate and spawn. Parasites found in our survey included cestodes and leeches.(Images Kate Hutson)

Para-Site

Para-Site

Para-Site eBook initiative led by Peter O'Donohue requires reviewers for the following list of parasites, if you are an expert in one or more of the parasites listed, and are willing to provide a bit of time to review the text, please let Danny Wilson know via email.

Parasite genus
Strongyloides
Nematodirus
Ollulanus
Nippostrongylus
Chabertia
Oesophagostomum
Stephanurus
Syngamus
Dictylocaulus
Metastrongylus
Protostrongylus
Muellerius
Parelaphostrongylus
Elaphostrongylus
Filaroides
Oslerus
Ascaridia
Oxyuris
Enterobius
Passalurus
Aspicularis
Parafilaria
Stephanofilaria
Onchocerca
Wuchereria
Brugia
Mansonella
Dipetalonema, Acanthocheilonema
Loa
Setaria
Camallanus
Dracunculus
Capillaria (*Eucoleus*), *Pseudocapillaria*
Haematopinus
Linognathus
Solenoptes
Pediculus
Pthirus
Trichodectes
Bovicola, Damalinia
Felicola
Lipeurus, Goniocotes, Goniodes, Cuclotogaster, Chelopistes
Menopon, Menacanthus, Holomenopon
Heterodoxus
Cimex
Triatoma, Panstrongylus, Rhodnius
Pulex
Echidnophaga
Ctenocephalides
Xenopsylla
Spilopsyllus

Tunga
Ceratophyllus
Nosopsyllus
Culex, Aedes, Mansonia
Anopheles
Culicoides
Simulium
Phlebotomus, Lutzomyia
Tabanus, Chrysops, Haematopota
Glossina
Melophagus
Hippobosca
Musca
Stomoxys
Haematobia
Lucilia, Calliphora
Cochliomyia, Chrysomya
Cordylobia
Sarcophaga
Wohlfahrtia
Dermatobia
Hypoderma
Gasterophilus
Ornithonyssus
Dermanyssus
Pneumonyssus, Pneumonyssoides
Raillietia
Sternostoma
Varroa
Demodex
Cheyletiella
Myobia
Psorobia, Psorergates
Trombicula, Eu-, Neo-, Lepto-trombicula
Psoroptes
Otodectes
Chorioptes
Sarcoptes
Notoedres
Trixacarus
Cytodites
Lynxacarus
Leporacarus
Chirodiscoides
Myocoptes
Knemidocoptes
Laminosioptes

JOBS

Jobs in Parasitology

Postdoctoral position at the Dept. of Molecular Parasitology/Humboldt University Berlin see more information:

https://www.parasite.org.au/jobs/

STA member news

Science Technology Australia, update sent to members 21st June 2024.

It has been a delight over the last couple of weeks to meet so many of our member organisations through the two online Meet the CEO sessions. I've been blown away to hear about the game-changing work you're doing, your passion for science, the powerful backing you give the sector, and the amazing contributions you're making to the country. Thank you to everyone who came along and shared their views on what's happening in the sector, aired their concerns, talked with us about STA's advocacy, or just popped in to say hello and hear the latest from us. The team and I have enjoyed the sessions so much that we have decided to make them an ongoing event. A virtual coffee with the CEO and members of the staff team will now be held on the second Tuesday of every month at midday (Canberra time) – register for the next one here.

It has also been great to meet with many of STA's key external stakeholders in Parliament, the Australian Research Council and Federal Departments, to clarify our priorities and to discuss the forthcoming Strategic Examination of R&D Funding.

This week we made a submission to the Department of Education's draft International Education and Skills Strategic Framework – you can read our submission here. Our key recommendations are that Government exempt international higher degree by research (HDR) students from any future caps or managed growth settings, and conduct deeper joint analysis and projections of Australia's workforce needs and how managed growth settings for international education can play in addressing critical skills and workforce gaps. Australia will need significant STEM skills and ideas in the future – so let's not turn off the tap.

Last week the Australian Bureau of Statistics released new data on government investment in R&D. We welcome this investment but are disappointed that Government investment in R&D, as a percentage of GDP, remains unchanged since 2018 at 0.17 per cent. Australia urgently needs deeper and sustained investment in research from government, universities and particularly business to lift our stubbornly low level of R&D funding as a percentage of GDP. We cannot continue to tolerate a slide, particularly as our economic rivals seriously ramp up their own investment. We look forward to working with Government through the Strategic Review of R&D Funding announced by Industry and Science Minister Ed Husic, as well as the Future Made in Australia agenda, to boost funding to the R&D that will power our country's economy.

Sharing and showcasing science is critical to inspiring the next generation, this is why I was pleased to read this week that the nation's science agency CSIRO will take on the publication of the excellent science news magazine Cosmos. Cosmos, through its wide audience, played a key role in addressing misinformation at the start of the COVID-19 pandemic. Quality Australian science journalism deserves support, and we look forward to seeing what Cosmos will do in its new relationship with CSIRO.

The recent Australian Curriculum, Assessment and Reporting Authority (ACARA) report casts a sad shadow on school science proficiency. This is why it was particularly welcoming to see the NSW Government's Budget released on Tuesday by State Treasurer Daniel Mookhey included a $481 million boost to the State's schools. Much more is needed across all states and territories to equip the next generation with the science and technology skills needed to address Australia's most complex challenges. Australia's teachers are great, parents are doing their best and children are trying hard, but there is a desperate need for all states and the Commonwealth to provide schools, teachers (especially those teaching out of field), families and students the tools and resources they need. STA will continue to strongly advocate for supporting STEM in the school education system.

Best wishes,

Ryan Winn

CEO, Science & Technology Australia

Aotearoa Aquatic Diseases Symposium

Registration and abstract submission are open for the second Aotearoa Aquatic Diseases Symposium (AADS-2), to be held 12th–14th February 2025 on the campus of the University of Otago, in Dunedin! Please circulate this widely to all those who may be interested!

Following on the success of the inaugural Aotearoa Aquatic Diseases Symposium (AADS) hosted by the Cawthron Institute in Nelson 2023, AADS-2 will build on the strength of the inaugural symposium to maintain momentum and promote exchanges and collaboration. The symposium will provide a forum where people from academia, government, industry and communities can share research and insights into diagnostics, epidemiology and management of aquatic diseases. The symposium encourages broad perspectives including the role of Mātauranga Māori, the rapidly changing landscape of aquatic disease emergence, the challenges to our biosecurity, and the future safeguard of people, environment, wildlife and the seafood industries.

Deadline for registration: 15 November 2024

With a generous subsidy from the MBIE Endeavour Emerging Aquatic Diseases programme, support from the Cawthron Institute and the University of Otago, and kind sponsorship from Awanui Veterinary, Nautilus Collaboration, New Zealand King Salmon, and Sealord Group Ltd, we are delighted to offer a very affordable, all-inclusive (lunches, social mixer at the end of day 1, conference dinner on day 2) registration fee:

Regular attendee: NZ$180 (+Humanitix booking fee)
Student: NZ$150 (+Humanitix booking fee)

Please register using this link: https://events.humanitix.com/aotearoa-aquatic-diseases-symposium-aads-2

Abstract

If you wish to give a presentation at the symposium, please email Jerusha Bennett (jerusha.bennett@otago.ac.nz).

Guest speakers

The symposium will feature presentations from invited speakers covering a range of topics, including:

Wendi Roe (Massey University)
Andrea Barcelo (Animal Health Lab, Biosecurity NZ)
Zac Waddington (New Zealand King Salmon)
Janelle Wierenga (University of Otago)
Nigel French (Massey University)

Optional satellite activities

We are planning activities of relevance to aquatic disease research and management before and after the symposium. These are open only to people registered for AADS-2, however the number of places available are limited; those interested can obtain further information and must pre-enrol by contacting the organiser:

Next-generation disease diagnostic in aquaculture (all day, Tuesday 11th February) (Maximum 30 participants). Organiser: Francisca Samsing, francisca.samsingpedrals@sydney.edu.au

Seabird necropsy workshop (afternoon Friday 14th February) (Maximum 10 participants). Organiser: Jerusha Bennett, jerusha.bennett@otago.ac.nz

Symposium venue, Accommodation, and Dunedin

AADS-2 (meeting and all meals) will take place in the University Union building, right on the University of Otago campus. There are several affordable options for accommodation within a 15-minute walk from the venue. Attendees can also enjoy the wonderful wildlife of the Otago Peninsula (albatrosses, penguins, fur seals, sea lions...) as part of their visit to Dunedin! For a list of accommodation options and tourism information, see: https://www.dunedinnz.com/visit

So please save those dates (12th–14th February 2025) and share this announcement with others! We look forward to seeing you at AADS-2 in February!

8th International Giardia and Cryptosporidium Conference

8th International Giardia and Cryptosporidium Conference, 23 - 26 February, 2025, Melbourne, Australia
www.igcc2025.au

Early bird registration and abstract submission will remain open until November 30th, 2024.

We are delighted to announce the 8th International Giardia & Cryptosporidium Conference (IGCC) from 23rd February to 26th February 2025 in Melbourne, Victoria, Australia. Since 2014, the International Giardia and Cryptosporidium Conferences (IGCC) have provided an international platform for researchers and practitioners involved in the study of these parasites. IGCC has become an established barometer of the advances made in confronting and controlling Giardia and Cryptosporidium infections throughout the world and covers a breadth of disciplines including:

- Molecular and cellular biology
- Genomics and systems biology
- Taxonomy and phylogenetics
- Population genetics, diagnostics and epidemiology
- Host-parasite interactions and immunology
- Pathogenesis of disease
- New treatment development
- Improved control strategies and public health policies

Major research program themes:
Diagnostics and detection from environment to farm to clinic; Foodborne, Waterborne and Environmental transmission and control; Infection management in humans and animals Advances in drug and vaccine discovery and alternative treatments; Indigenous and Global Health; Mechanisms of disease and host-pathogen interactions; Virulence and Immunology; Infection and in vitro growth models; Molecular and Cellular Biology Evolutionary Biology; Advanced methods development.

Equity and Diversity:
IGCC2025 is committed to broad representative and diversity amongst its delegates and conference speakers. We are committed to gender parity among our invited speakers and session chairs and to provide a welcoming and engaging conference experience to delegates across our international research community. We are also a family friendly conference and will provide a parents room for delegates during the event.

A primary focus of the conference is to provide delegates with outstanding value, an enriched program and a number of memorable experiences within and alongside the conference itself. This will include social events that provide delegates with an exceptional opportunity to engage in uniquely Australian cultural activities and world-class scientists. We will be hosting the event in the newly built Melbourne Connect conference facility within the University of Melbourne campus and on the northern edge of Melbourne's central business district. All of this will be available at an affordable cost and, we hope to welcome all of you to Melbourne and look forward to seeing you all once again.

I look forward to seeing you all at the 8th International Giardia and Cryptosporidium Conference in Melbourne in February, 2025. If you require any additional information, please contact me at jex.a@wehi.edu.au.

Very best wishes,
Aaron Jex
Chair IGCC 2025

ISFP conference 20-24 January, 2025

XI
International Symposium on Fish Parasites

Mexico, Yucatán

Fish Health, Parasites and Biodiversity Conservation

January 20-24

Local Organizing Commettee

ISFPXI@enesmerida.unam.mx

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https://isfpxi.com/

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