Dr Alison C MacFadyen

Employment

2023 – (2023) **The Sainsbury Laboratory**
Computational Biologist

Job Description: I work as part of the Bioinformatics Team at TSL, providing support and guidance to researchers enabling them to successfully analyse their data. As part of my role, I develop software and pipelines to assist the analysis of high throughput genomic data on our HPC. I also provide one on one bioinformatic training as required and produce tutorials to aid self-directed learning. I manage internal data processing and external data submission.

2020 – 2022 **University of Glasgow**
Postdoctoral Research Associate

Postdoctoral Project: I worked as part of a consortium, supporting the national action plan on antimicrobial resistance (SNAP-AMR) in Tanzania. This work was a collaborative endeavour between clinicians, social scientists, epidemiologists and microbiologists. My role was to lead the bioinformatic analysis of our study isolates to determine the carriage and spread of AMR determinants. In addition, via whole genome sequence analysis, I also established phylogenetic relationships between isolates.

2019 – 2020 &
2021 – 2022 **Maternity Career Break**

Description: I have had two maternity career breaks, one in 2019 – 2020 and another in 2021 – 2022.

2018 – 2019 **Freelance Bioinformatics Consultant**

Job Description: I provide freelance support for bioinformatic and molecular microbiology problems, primarily via the Industrial Biotechnology Innovation Centre (IBioIC) Technical Network (see Appointments below).

2017 – 2018 **University of Edinburgh**
Postdoctoral Research Associate (Bioinformatician)

Postdoctoral Project: This post involved working within the Royal (Dick) School of Veterinary Studies and The Roslin Institute as a research bioinformatician. My role primarily involved the analysis of whole-genome sequences of bacterial pathogens, to investigate antimicrobial resistance, virulence, as well as the phylogenetic relationships between isolates. This allowed me to apply my skills in comparative genomics to numerous bacterial species such as *Staphylococcus aureus, S. pseudintermedius, Enterococcus faecium, Streptococcus pneumoniae, Macrococcus caseolyticus* and other staphylococci. I have utilised various command line tools including; **Roary, Prokka, SPAdes, Parsnp, Bowtie2, Cgview Comparison Tool, ARIBA and custom scripts.**

2015 – 2017 **Newcastle University**
Postdoctoral Research Associate

Postdoctoral Project: EPSRC Bright Ideas project working on the removal of micropollutants from wastewater by utilising bacteria. By combining genome sequence data with molecular cloning and metabolomics I aimed to identify primary enzymes involved in the removal of specific micro-pollutants. I worked primarily with strains of *Pseudomonas putida* and various *Rhodococcus* species.

2014 – 2015 **University of Strathclyde**
Postdoctoral Research Associate

Postdoctoral Project: IBioIC Exemplar Project working on "Comparative transcriptomic and metabolomic analysis of engineered bacteria". This work was carried out in partnership with the company Ingenza Ltd, within the Strathclyde Institute of Pharmacy and Biomedical Sciences. During this project I worked with strains of *Corynebacterium glutamicum*, grown initially in pilot scale fermenters. I carried out both whole genome sequencing and RNA-sequencing, comparing these analyses with data I generated using LC-MS. This allowed us to better understand the fate of specific primary metabolites and the impact of genetic changes introduced into our engineered strains, ultimately allowing us to optimise the fermentation process.

Appointments

2017 – 2022 **IBioIC**
Consultant

Consultant Role: I provided freelance advice and support for IBioIC members who required additional support for diverse bioinformatic problems. This was offered via the Technical Network established by IBioIC.

2015 – 2022 **University of Strathclyde**
Visiting Scientist

Visiting Scientist Role: I maintained and supported the running of the computational biology server I established at the University of Strathclyde while working there as a Postdoctoral Research Associate. This server is used for both research and teaching.

Education

2010 – 2014 **University of Strathclyde**
PhD Strathclyde Institute of Pharmacy and Biomedical Sciences

PhD Project: Determination of the genetic basis of oxytetracycline productivity for *Streptomyces rimosus*, by the correlation of genomic data. I was analysing the genetic basis for improved antibiotic production in industrial strains of the bacterium *Streptomyces rimosus*. By identifying single nucleotide polymorphisms (SNP), as well as insertions and deletions (InDels), of the production strains, I was able to introduce those changes in the original isolate, thus determining which genetic changes led to increased antibiotic productivity.

2006 - 2010 **University of Strathclyde**
First Class BSc. (Hons.) Immunology and Microbiology

4th year Project: Investigating the roles of the homologous genes, *pglX* and *pglS,* in the phage growth limitation system in *Streptomyces coelicolor* A3(2), using gene knockout strains and fitness experiments.

Professional Memberships and External Roles

- Successfully applied to obtain Data Carpentry Instructor training for June 2024.
- Member of the Glasgow Crucible Research Leadership Programme for 2022.
- Currently elected to the Sustainability Committee within the Microbiology Society.
- Previously elected to the ECM Forum Executive committee as the Conferences Representative
- I was Chair of the Microbiology Society's Project Steering Group for their Open Research Platform
- A member of the UKRI Early Career Researcher Forum

- Reviewed publications for journals such as Access Microbiology and FEMS Microbiology Letters
- I have been an active STEM ambassador and have participated in numerous outreach activities, having volunteered for University of Edinburgh Easter Bush Science Outreach Centre activities.
- Worked for a month at the East China University for Science and Technology in Shanghai, during a British Council funded collaborative exchange
- Successfully applied to participate in the John Innes/Rudjer Boškovic; Summer Schools in Applied Molecular Microbiology

Publications

Published

- **MacFadyen, AC**; Paterson, GK. (2024). Methicillin resistance in *Staphylococcus pseudintermedius* encoded within novel staphylococcal cassette chromosome *mec* (SCC*mec*) variants. 2024, dkae096. doi: 10.1093/jac/dkae096
- McSorley, JC, **MacFadyen, AC**; Kerr, L; Tucker, NP. (2022). Host lysolipid differentially modulates virulence factor expression and antimicrobial susceptibility in *Pseudomonas aeruginosa*. Microbiology, 2022, 168(7). doi: 10.1099/mic.0.001179.
- Pickering, AC; Yebra, G; Xiangyu, G; Goncheva, MI; Wee, BA; **MacFadyen, AC**; Muehlbauer, LF; Alves, J; Cartwright, RA; Paterson, GK; Fitzgerald, RJ. (2021). Evolutionary and Functional Analysis of Coagulase Positivity among the Staphylococci. mSphere, 2021 Aug 25;6(4):e0038121. doi: 10.1128/mSphere.00381-21
- **MacFadyen, AC**; Leroy, S; Harrison, EM; Parkhill, J; Holmes, M; Paterson, GK. (2019). *Staphylococcus pseudoxylosus* sp. nov., isolated from bovine mastitis. International Journal of Systematic and Evolutionary Microbiology, doi: 10.1099/ijsem.0.003416
- **MacFadyen, AC**; Harrison, EM; Morgan, FJE; Parkhill, J; Holmes, MA; Paterson, GK. (2019). A *mecC* allotype, *mecC3*, in the CoNS *Staphylococcus caeli*, encoded within a variant SCC*mecC*. Journal of Antimicrobial Chemotherapy. 1;74(3):547-552. doi: 10.1093/jac/dky502
- **MacFadyen, AC**; Walker, A; Paterson, GK. (2019). *Streptococcus hillyeri* sp. nov., isolated from an equine tracheal sample. International Journal of Systematic and Evolutionary Microbiology. doi: 10.1099/ijsem.0.003489
- **MacFadyen, AC**; Fisher, E; Costa, B; Cullen, C; Paterson, G. (2018). Genomic epidemiology of methicillin-resistant *Macrococcus caseolyticus* from dairy cattle bulk tank milk in England and Wales. Microbial Genomics. 2018, Aug;4(8). doi: 10.1099/mgen.0.000191
- **MacFadyen, AC**; Harrison, EM; Ellington, MJ; Parkhill, J; Holmes, MA; Paterson, GK. (2018) A highly conserved *mecC* encoding SCC*mec* type XI in a bovine isolate of methicillin-resistant *Staphylococcus xylosus*. Journal of Antimicrobial Chemotherapy. 2018, Aug 27. doi: 10.1093/jac/dky333
- **MacFadyen, AC**; Drigo, I; Harrison, EM; Parkhill, J; Holmes; Paterson, GK. (2018). *Staphylococcus caeli* sp. nov., isolated from air sampling in an industrial rabbit holding. International Journal of Systematic and Evolutionary Microbiology. Int J Syst Evol Microbiol. 2018 Nov 14. doi: 10.1099/ijsem.0.003098
- Beaton, A*; Lood, C*; Cunningham-Oakes, E*; **MacFadyen, A***; Mullins, Alex; El Bestawy, W; Botelho, J; Chevalier, S; Coleman, S; Dalzell, C; Dolan, S; Faccenda, A; Ghequire, M; Higgins, S; Kutschera, A; Murray, J; Redway, M; Salih, T; da Silva, A; Smith, B; Smits, N; Thomson, R; Woodcock, S; Welch, M; Cornelis, P; Lavigne, R; van Noort, V; Tucker, N. (2018). Community-led comparative genomic and phenotypic analysis of the aquaculture pathogen *Pseudomonas baetica* a390T sequenced by Ion semiconductor and Nanopore technologies, FEMS Microbiology Letters. doi: 10.1093/femsle/fny069 *Joint First Authors
- Pethick, F. E., **MacFadyen, A. C**., Tang, Z., Sangal, V., Liu, T.-T., Chu, J., Kosec, G., Petkovic, H., Guo, M., Kirby, R., Hoskisson, P.A., Herron, P.R., Hunter, I. S. (2013). Draft genome sequence of the oxytetracycline-producing bacterium *Streptomyces rimosus* ATCC 10970. Genome Announcements, 1(2). doi: 10.1128/genomea.00063-13

Awards and Grants

- £682, Harry Smith Vacation Studentship. Title: The Silent Majority – SCCmec Diversity of non-*aureus* Staphylococci (under review).
- €2000, FEMS Meeting Organiser Grant, support for the ECM Forum Summer Conference (2019)
- £280, Microbiology Society, Travel Grant for Presentation at Annual Conference, Birmingham, 2018
- £465, Microbiology Society, Travel Grant for Presentation at Microbiology Society Spring Meeting, 2013
- £340, Microbiology Society, Travel Grant for Presentation at Microbiology Society Autumn Meeting, 2012
- €600, FEMS Meeting Attendance Grant for participation in the John Innes/Rudjer Bošković Summer School in Applied Molecular Microbiology, 2012
- £500, Microbiology Society, Scientific Meetings Travel Grant for Presentation at the 16th International symposium on the Biology of Actinomycetes, 2011
- £100, Chivas Prize, for the best final year performance during my Undergraduate Degree

Presentation of Research

- Microbiology Society Annual Conference, 2024 (poster, *"Ecoligy" – Genomic & Phenotypic surveillance of faecal coliforms in the River Deben; what you count isn't what you get, Edinburgh)
- University of Glasgow Computational Biology Conference, 2022 (offered oral, Computational Biology for Interrogating Bacterial Genomes - What we can and cannot do, Glasgow)
- Microbiology Society Annual Conference, 2021 (poster, Genomic and Phenotypic Characterisation of Multi-Drug Resistant *Escherichia coli* carried by meat handlers and slaughterhouse meat from North-Western Tanzania, online). https://doi.org/10.1099/acmi.ac2021.po0447
- ECM Forum Online 2021: Presenting and Networking Online, 2021 (oral presentation, Practice for Success: Prepare for the challenges of presenting virtually, online)
- World One Health Congress, 2020 (poster, Prevalence and Transmission of MDR ESBL *Escherichia coli* in Meat and Meat Vendors in North Western Tanzania, online)
- Microbiology Society, 2019 (poster, Pangenomic analysis of *Staphylococcus pseudintermedius* to better understand antimicrobial resistance profiles, Belfast)
- ARCH-UK Finfish and Shellfish Microbiome Workshop, 2018 (offered oral, Microbiome Research: A Bioinformatician's Perspective, Aberdeen)
- Microbiology Society, 2018 (poster, A novel *mecC* allotype, *mecC3*, in a new staphylococcal species, *Staphylococcus caeli* sp. Nov., carried on a SCC*mec* element, Birmingham)
- SULSA AMR conference, 2018 (poster, A novel *mecC* allotype, *mecC3*, in a new staphylococcal species, *Staphylococcus caeli* sp. Nov., carried on a SCC*mec* element, Glasgow)
- Microbiology Society (Formerly SGM), 2017 (poster, *Heavy metal-inducible antimicrobial activity by *Streptomyces* spp. isolated from the Leadhills and Wanlochead lead mines, Edinburgh)
- International Society of Microbial Ecology, 2016 (poster, The removal of micropollutants from wastewater – harnessing bacteria, Montreal)
- SGM 2015 (posters, *Heavy metal-inducible antibiotic production by *Streptomyces* spp. isolated from the Leadhills and Wanlochead lead mines; *Characterisation of pectobacterial bacteriophages for use in control of bacterial pathogens in crops)
- The International Symposium on the Biology of Actinomycetes 2014 (poster, Genomic Characteristics of Advanced Oxytetracycline Production Strains of *Streptomyces rimosus*)
- SGM 2013 (poster, Elucidation of the rimocidin biosynthetic cluster in *Streptomyces rimosus,* Manchester)
- John Innes/Rudjer Bošković Summer Schools in Applied Molecular Microbiology, 2012 (poster, Antibiotic Productivity in *Streptomyces rimosus,* Dubrovnik)

- The Society for General Microbiology 2012 (offered paper talk, Investigating Antibiotic productivity in *Streptomyces rimosus*, Warwick)
- The International Symposium on the Biology of Actinomycetes 2011 (poster, Antibiotic Productivity in *Streptomyces rimosus*, Mexico)

*Contributing author

Teaching

I have experience in student project supervision and taught practicals and tutorials:

- Running a Metagenomics Workshop for The Sainsbury Laboratory Summer Conference in Plant-Microbe Interactions (15th-26th of July, 2024).
- Taught "Introduction to Shell Genomics" and "Wrangling Genomics", based on Data Carpentry course, to the MSc Data Science students.
- Masters Student – Beth Anderson (2022), project title "Identifying antimicrobial resistance and virulence associated genes in *Klebsiella pneumoniae* and *Klebsiella quasipneumoniae* isolates from a household in Northern Tanzania", graduated.
- Masters Student – Sally Felle (2022), project title "The population structure, antibiotic resistance, and virulence potential of *Klebsiella variicola* isolated from the community in Tanzania", graduated.
- Masters Student – Chengetai Diana Mpamhanga (2022), project title "Peri-urban community carriage of *Escherichia coli* at the human-animal interface in northern Tanzania", graduated.
- Masters Student – Stuart Simms (2015) an IBioIC funded student working between Ingenza and the University of Strathclyde, project title "A Novel Glutamate Production Pathway", graduated.
- ERASMUS Student – Sara Aljama López (2015) from the University of Valencia, working on the project entitled "Investigation of secondary metabolite production by *Streptomyces rimosus*"
- Summer Undergraduate Student – Stephen Ballantyne (2015) working on a project examining clinical isolates of *Pseudomonas aeruginosa*.
- Taught in undergraduate laboratories spanning 1st to 3rd year
- Taught in bioinformatics tutorials and setup a Galaxy platform for teaching at Strathclyde.