Siân V. Owen

Curriculum vitae

Current affiliation & contact:
Department of Biomedical Informatics
& Laboratory of Systems Pharmacology
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STATEMENT OF RESEARCH INTEREST & EXPERTISE

My research focusses on the fundamental molecular biology of bacterial viruses (phages) and how they contribute to the biology, ecology and evolution of bacterial pathogens. I have expertise in genetic techniques including large-scale manipulations of bacterial chromosomes, phage engineering, as well as considerable experience in genomics and bioinformatics. Most recently I have become interested in high-throughput experimental technologies including robotic automation techniques, and experimental evolution.

EDUCATION & RESEARCH EXPERIENCE

2018 – pres. (Apr –)
Postdoctoral Research Fellow
Harvard Medical School
In the group of Professor Michael Baym
Working on and supervising multiple phage-related projects within the lab, including dissecting the interaction between prophages and evolution of antibiotic resistance, and discovery of bacteriophages dependent on conjugative plasmid-encoded receptors

2017 – 2018 (Oct – Apr)
Postdoctoral Research Associate
University of Liverpool
In the group of Professor Jay Hinton
Working on a Wellcome Trust-funded project to identify the virulence determinants that allow African *Salmonella* Typhimurium to cause significant mortality in Africa

2013 – 2017
PhD in Biological Sciences
University of Liverpool
Supervised by Professor Jay Hinton and Dr Nicholas Feasey
Thesis title: Exploring the prophage biology of *Salmonella enterica* serovar Typhimurium ST313
Additional training modules included:
Programming for Life Sciences (Perl), Informatics for Life Sciences, Advanced Statistics for Biological Research

2012 – 2013
MRes in Biosciences (Awarded with distinction)
Cardiff University
Supervised by Dr Tom Connor
Thesis title: Population Structure and Differentiation of S*almonella* Paratyphi B and *Salmonella* Java
Modules studied include:
9 month research project, Key skills in research practice, Research techniques in Biosciences, Data handling and statistics, Bioinformatics

2009 – 2012
BSc in Microbiology (2:1)
Cardiff University
Final year project supervised by Dr Julian Marchesi
Dissertation title: Cloning and Expression of Bile Salt Hydrolase in *Escherichia coli*
Key modules: Medical microbiology, Microbiology research techniques, Non-bacterial pathogens, Human infectious diseases

2006 – 2008
International Baccalaureate Diploma (34 points)
Higher level subjects: Biology, Chemistry, English Literature
Standard level subjects: Spanish, Psychology, Mathematics
Self-directed research project entitled: The inhibitory effects of commercially available dental mouthwashes on bacteria

2001 – 2006 **GCSEs (12 awarded with grades A*-B)** Including Double A* award in Science

RESEARCH PUBLICATIONS

* Publications where I am first or joint-first author are indicated with an asterisk
# Publications where I am corresponding or co-corresponding author are indicated with a hash

Wolput, S., Makumi, A., Wicke, L., Bäcker, L.E., Cenens, W., Briers, Y., Wenner, N.A., **Owen, S.V.**, Hinton, J.C., and Lavigne, R. (2022). Transcriptional Organization of the Salmonella Typhimurium Phage P22 pid ORFan Locus. International Journal of Molecular Sciences *23*, 1253.

Silpe, J.E., Wong, J.W., **Owen, S.V.**, Baym, M., and Balskus, E.P. (2022). The bacterial toxin colibactin triggers prophage induction. Nature *603*, 315–320.

Nyerges, A., Vinke, S., Flynn, R., **Owen, S.V.**, Rand, E.A., Budnik, B., Keen, E., Narasimhan, K., Marchand, J.A., and Baas-Thomas, M. (2022). Swapped genetic code blocks viral infections and gene transfer. bioRxiv.

Limdi, A., **Owen, S.V.**, Herren, C., Lenski, R.E., and Baym, M. (2022). Parallel changes in gene essentiality over 50,000 generations of evolution. bioRxiv.

Koolman, L., Prakash, R., Diness, Y., Msefula, C., Nyirenda, T.S., Olgemoeller, F., Perez-Sepulveda, B., Hinton, J.C., **Owen, S.V.**, and Feasey, N.A. (2022). Case-control investigation of invasive Salmonella disease in Africa-comparison of human, animal and household environmental isolates find no evidence of environmental or animal reservoirs of invasive clades/strains. medRxiv.

Owen, S.V.*#, **Wenner, N.***, Dulberger, C.L., Rodwell, E.V., Bowers-Barnard, A., Quinones-Olvera, N., Rigden, D.J., Rubin, E.J., Garner, E.C., and Baym, M. (2021). Prophages encode phage-defense systems with cognate self-immunity. Cell Host & Microbe.

Owen, S.V.*, **Perez-Sepulveda, B.M.*,** and Adriaenssens, E.M. (2021). Detection of bacteriophages: sequence-based systems. Bacteriophages: Biology, Technology, Therapy, 621–644.

Qian, J., Lu, Z., Mancuso, C.P., Jhuang, H.-Y., del Carmen Barajas-Ornelas, R., Boswell, S.A., Ramírez-Guadiana, F.H., Jones, V., Sonti, A., and Sedlack, K. (2020). Barcoded microbial system for high-resolution object provenance. Science *368*, 1135–1140.

Preciado-Llanes, L., Aulicino, A., Canals, R., Moynihan, P.J., Zhu, X., Jambo, N., Nyirenda, T.S., Kadwala, I., Gerós, A.S., **Owen, S.V.** (2020). Evasion of MAIT cell recognition by the African Salmonella Typhimurium ST313 pathovar that causes invasive disease. Proceedings of the National Academy of Sciences *117*, 20717–20728.

Owen, S.V.*#, Canals, R., Wenner, N., Hammarlöf, D.L., Kröger, C., and Hinton, J.C. (2020). A window into lysogeny: revealing temperate phage biology with transcriptomics. Microbial Genomics.

Honeycutt, J.D., Wenner, N., Li, Y., Brewer, S.M., Massis, L.M., Brubaker, S.W., Chairatana, P., **Owen, S.V.**, Canals, R., and Hinton, J.C. (2020). Genetic variation in the MacAB-TolC efflux pump influences pathogenesis of invasive Salmonella isolates from Africa. PLoS pathogens *16*, e1008763.

Lacharme-Lora, L.*, **Owen, S.V.***, Blundell, R., Canals, R., Wenner, N., Perez-Sepulveda, B., Fong, W.Y., Gilroy, R., Wigley, P., and Hinton, J.C. (2019). The use of chicken and insect infection models to assess the virulence of African Salmonella Typhimurium ST313. PLoS neglected tropical diseases *13*, e0007540.

Canals, R., Hammarlöf, D.L., Kröger, C., **Owen, S.V.**, Fong, W.Y., Lacharme-Lora, L., Zhu, X., Wenner, N., Carden, S.E., and Honeycutt, J. (2019). Adding function to the genome of African Salmonella Typhimurium ST313 strain D23580. PLoS biology *17*, e3000059.

Canals, R., Chaudhuri, R.R., Steiner, R.E., **Owen, S.V.**, Quinones-Olvera, N., Gordon, M.A., Baym, M., Ibba, M., and Hinton, J.C. (2019). The fitness landscape of the African Salmonella Typhimurium ST313 strain D23580 reveals unique properties of the pBT1 plasmid. PLoS pathogens *15*, e1007948.

Hammarlöf, D.L.*, **Kröger, C.***, **Owen, S.V.***, Canals, R., Lacharme-Lora, L., Wenner, N., Schager, A.E., Wells, T.J., Henderson, I.R., and Wigley, P. (2018). Role of a single noncoding nucleotide in the evolution of an epidemic African clade of Salmonella. Proceedings of the National Academy of Sciences *115*, e2614–e2623.

Owen, S.V.*, Wenner, N., Canals, R., Makumi, A., Hammarlöf, D.L., Gordon, M.A., Aertsen, A., Feasey, N.A., and Hinton, J.C. (2017). Characterization of the prophage repertoire of African Salmonella Typhimurium ST313 reveals high levels of spontaneous induction of novel phage BTP1. Frontiers in microbiology *8*, 235.

Faulkner, M., Rodriguez-Ramos, J., Dykes, G.F., **Owen, S.V.**, Casella, S., Simpson, D.M., Beynon, R.J., and Liu, L.-N. (2017). Direct characterization of the native structure and mechanics of cyanobacterial carboxysomes. Nanoscale *9*, 10662–10673.

Ashton, P.M.*, **Owen, S.V.*,** Kaindama, L., Rowe, W.P., Lane, C.R., Larkin, L., Nair, S., Jenkins, C., de Pinna, E.M., and Feasey, N.A. (2017). Public health surveillance in the UK revolutionises our understanding of the invasive Salmonella Typhimurium epidemic in Africa. Genome medicine *9*, 1–13.

Connor, T., **Owen, S.V.**, Langridge, G., Connell, S., Nair, S., Reuter, S., Dallman, T., Corander, J., Tabing, K., and Le Hello, S. (2016). What's in a Name? Species-Wide Whole-Genome Sequencing Resolves Invasive and Noninvasive Lineages of Salmonella enterica Serotype Paratyphi B. mBio *7*, e00527-16.

Srikumar, S., Kröger, C., Hébrard, M., Colgan, A., **Owen, S.V.**, Sivasankaran, S.K., Cameron, A.D., Hokamp, K., and Hinton, J.C. (2015). RNA-seq brings new insights to the intra-macrophage transcriptome of Salmonella Typhimurium. PLoS pathogens *11*, e1005262.

CONFERENCE PRESENTATIONS

Sep 2014: EMBO Viruses of Microbes 2014, Zurich, Switzerland
Poster presentation: **RNA-seq from 16 infection-relevant conditions resolves the gene expression profiles and possible contribution to virulence of temperate bacteriophages within the genome of an invasive African *Salmonella* Typhimurium strain**

Aug 2015: 21ST Biennial Evergreen Bacteriophage Meeting, Evergreen State College, Washington State, USA
Poster presentation: **BTP1: A highly active prophage carried by African *Salmonella* Typhimurium ST313**

Apr 2016: Microbiology Society Annual Conference 2016, Liverpool, UK
Poster presentation: **The distribution of prophages in UK and African populations of *Salmonella* Typhimurium ST313**

Jul 2016: EMBO Viruses of Microbes 2016, Liverpool UK
15 minute offered oral presentation and poster: **Prolific spontaneous induction of novel prophage BTP1 in epidemic African *Salmonella* Typhimurium**

Sep 2016: 5th ASM Conference on *Salmonella*, Potsdam, Germany
Poster presentation: **Novel prophage BTP1 is associated with epidemic African *Salmonella* Typhimurium ST313 but not present in diverse UK lineages**

Apr 2017: Microbiology Society annual conference 2017, Edinburgh, UK
15 minute offered oral presentation: **Contrasting evolutionary fortunes for prophages in an epidemic Salmonella lineage**

Apr 2017: Centennial Celebration of Bacteriophage Research, Institute Pasteur, Paris, France
Poster presentation: **Contrasting evolutionary fortunes for prophages in an epidemic *Salmonella* lineage**

Nov 2017: Global Health Day conference- the UK contribution to innovation in global health, London, UK
Poster presentation: **Innovative public health surveillance in the UK revolutionises our understanding of the invasive *Salmonella* Typhimurium epidemic in Africa**

Mar 2018: 11th Annual Northwest Microbiology Meeting, Salford, UK
15 minute offered oral presentation: **Identification of a novel phage infection immunity protein by transcriptomic analysis of a *Salmonella* prophage**

Mar 2018: 5th Meeting of Regulating with RNA in Bacteria & Archaea, Seville, Spain
Poster presentation: **A prophage-encoded antisense RNA mediates phage superinfection exclusion in *Salmonella* Typhimurium**

Sep 2018: Lake Arrowhead Microbial Genomics meeting (LAMG) 2018, California, USA

Poster presentation: **Temperate prophage elements increase bacterial sensitivity to antibiotics**

Jun 2019: ASM Microbe 2019, San Francisco, USA

15 minute offered oral presentation: **Temperate prophage elements sensitize bacteria to antibiotics**

15 minute offered oral presentation: **Identification of a novel family of phage-immunity proteins in Gram-negative bacteria by transcriptomic analysis of a *Salmonella* prophage**

Jul 2020: Boston Bacterial Meeting (BBM) 2020, Boston, USA

15 minute offered oral presentation: **Prophage immunity to their own phage-resistance proteins**

August 2022: 2022 Molecular Genetics of Bacteria and Phages, Madison, USA

Poster presentation: **Systematic discovery of plasmid-dependent bacteriophages**

INVITED TALKS

Dec 2017	**Invited Christmas lecture** Invited to give the annual Christmas lecture organised by the postgraduate microbiology society in the Moyne Institute, Trinity College Dublin, Ireland.
May 2019	**Invited seminar** Invited by the Graduate Student Association at McMaster University, Canada to talk at the Department of Biochemistry and Biomedical Sciences seminar series.
Oct 2019	**Invited seminar** Invited to give a seminar at the Parsons Lab Microbial Systems seminar series at MIT, USA.
May 2020	**Invited seminar (virtual)** Invited to give a seminar for the Phage Seminar Series at the University of Leicester, UK.
Sep 2020	**Invited seminar (virtual)** Invited to give a seminar for the Molecular and Genetics seminar series at Brandeis University, USA.
Oct 2020	**Invited lab meeting (virtual)** Invited to give a guest lab meeting for the Iqbal group at EMBL-EBI, Cambridge, UK.
Oct 2020	**Invited seminar (virtual)** Invited to give a seminar for the Salmonella and Enterics Group at the Malawi-Liverpool-Wellcome Trust Clinical Research Center, Malawi.
Mar 2022	**Invited seminar (virtual)** Invited to give a seminar for the Biology Department seminar series at the University of Regina, Canada.

AWARDS & PRIZES

Mar 2014	**Society for General Microbiology 'Society Conference Grant 2014'**- £120 towards attendance costs for the SGM Annual Conference, Liverpool, UK, 14-17 April 2014
Apr 2014	**Michael Pugh Thomas Fund for Postgraduate Students**- £300 towards attendance costs for the EMBO Viruses of Microbes Conference, Zurich, Switzerland, 14-18 July 2014
Mar 2015	**Highly commended poster** at the University of Liverpool Faculty of Health and Life Sciences Poster day
Apr 2015	**Best microbe-related talk & poster** at the Institute of Integrative Biology away day 2015- £100 personal prize
Jun 2015	**Society for General Microbiology 'Travel Grant 2015'-** £500 towards attendance at the 21st Biennial Evergreen International Phage Meeting Olympia, WA, USA, 02-07 August 2015
Dec 2015	**Third prize in the University of Liverpool Christmas card design competition**- £25 personal prize

Jul 2016	**Best poster presentation** at the University of Liverpool Genomes to Systems away day, as voted for by the Liverpool Life Sciences University Technical College students- £100 personal prize
Feb 2017	**Microbiology Society 'Society Conference Grant 2017'**- £240 towards attendance costs for the Microbiology Society Annual Conference, Edinburgh, UK, 3-6 April 2017
Dec 2017	**Microbiology Society 'Society Travel Grant 2018'**- £516 towards attendance costs for the 5th Meeting of Regulation with RNA in Bacteria & Archaea, Seville, Spain, 19-22 March 2018
Jan 2018	**Wellcome Trust Public Engagement Grant 2017 (co-applicant)-** £210 to run 'Let's Get Viral' family event about viruses at the Liverpool World Museum
Jul 2018	**Winner of Scientific Image Competition**- £100 personal prize for image of a flagellated *Salmonella* Typhimurium cell based on TEM.
Apr 2019	**Winner of the Roche Travel Award for Phage Genomics**- $500 prize to attend the ASM Microbe 2019 conference in San Francisco.

TEACHING AND ENGAGEMENT ACTIVITIES

Advanced Microbiological Techniques Life 228 (2014, 2015, 2016, 2017) Postgraduate demonstrator on 7 week-long second-year module at the University of Liverpool (UK). Responsibilities included supervising groups of students designing and undertaking short Microbiology research projects, supervising students carrying out set laboratory practical activities and delivering a 1-hour lecture on sterilization techniques.

Liverpool primary school student Microbiology outreach day (November 2015) Helped run at outreach activity day for local primary school children at the University of Liverpool (UK) to teach basic concepts about microbiology and infectious disease.

Virology Life 209 (2017) Tutor on second-year module at the University of Liverpool (UK). Responsibilities included running a tutorial for groups of 6 students to discuss general aspects of bacteriophage biology and mark essays.

'Let's Get Viral' (January 2018) Co-organized and ran a Wellcome Trust-funded public engagement activity day at Liverpool World Museum (UK) to educate the public about what viruses are what are the positive and negative effects they have on our lives.

Volunteer at Harvard Museum of Natural History (2018-2019) Weekend volunteer at the 'Microbial Life: A Universe at the Edge of Sight' exhibit, performing live microscopy demonstrations and engaging visitors to the exhibit about the wonders of the microbial world.

Organizer of 'HMS Phages' community college internship (Summer 2022) Coordinated an 8-week summer research internship for students at Roxbury Community College, Boston (USA). Students were taught how to isolate bacteriophages from environmental samples, characterize, sequence and analyze the genomes.

ACADEMIC REFERENCES

Dr Michael Baym
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Dr Nicholas Feasey
Liverpool School of Tropical Medicine
Pembroke Place Liverpool
L3 5QA
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