Finlay Maguire | Curriculum Vitae

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Education

Doctor of Philosophy	**University College London**
Bioinformatics	*October 2011 - July 2016*

Title: A Multi-omic Analysis of the Photosynthetic Endosymbioses of *Paramecium bursaria*
Supervisor: Thomas A. Richards
A reconstruction of cellular interactions in a nascent endosymbiotic system through novel application of machine learning and computational methods to analyse 'single' cell metagenomic, metabolomic, and metatranscriptomic datasets. It involved the first use of these datasets in the study of non-model multi-eukaryote systems.

Master of Arts	**University of Oxford**
Natural Sciences - Biological Sciences, Honours (2i)	*October 2008–June 2011*

Title: The Evolution of the Folate Biosynthesis Gene Fusions in the Eukaryotes.
Supervisor: Thomas A. Richards
Conducted an independent bioinformatics honours research project to polarise deep-branching relationships within the evolutionary tree of life.

Honours and Awards

Dalhousie Computer Science	**Halifax, NS**
Donald Hill Family Fellowship ($165,000)	*January 2019*
American Society of Microbiology	**Washington, DC**
Travel Award ($500)	*September 2018*
Canadian Society of Microbiology	**University of Manitoba**
Travel Award ($500)	*June 2018*
Dalhousie Computer Science In-House Conference	**Dalhousie University**
Best Presentation ($50)	*January 2018*
School of Informatics Jamboree	**University of Edinburgh**
Poster Prize (£50)	*March 2015*
National Data Science Bowl	**Neuroglycerin**
Top ~5% (57/1049)	*December 2014–March 2015*
American Epilepsy Society Seizure Prediction Challenge	**Neurogylcerin**
Top 5% (16/527)	*August–October 2014*
FEMS Young Scientist Grant	**Sant Feliu du Guixols, Spain**
Meeting Scholarship (£350)	*October 2013*
NASA Planetary Biology Program	**John F. Kennedy Space Center**
10-Week Research Fellowship (£3500)	*July–October 2013*
Earth and Space Foundation	**John F. Kennedy Space Center**
Research Scholarship (£300)	*July–October 2013*
FEMS Young Scientist Grant	**Sant Feliu du Guixols, Spain**
Meeting Scholarship (£350)	*October 2011*
4-Year Joint Institution PhD Studentship	**University College London**
UCL-NHM PhD Studentship (£70,000)	*October 2011–December 2016*

Society for General Microbiology Undergraduate Grant	**University of York**
Travel Award (£170)	*September 2011*
Dukinfield Exhibition in Biological Sciences	**University of Oxford**
Scholarship for Academic Excellence (£300)	*October 2009–July 2011*
Society for General Microbiology Harry Smith Studentship	**University of Exeter**
8-Week Research Scholarship (£1890)	*June–August 2010*

Experience

Research Experience

Donald Hill Family Fellow — **Dalhousie University**
Faculty of Computer Science — *January 2019–Present*
Independent fellowship partnered with fellows in Medicine and Sociology working on societal impacts of technology. This work builds and expands on existing public health antimicrobial resistance research. Additionally, active engagement with local non-profits in a data science consultancy role helping them to answer questions and unveil insights from their own data.

Postdoctoral Fellow — **Dalhousie University**
Faculty of Computer Science — *February 2017–January 2019*
Supervisor: Robert G. Beiko
Leading the development of the AMRtime project, a machine learning based antimicrobial resistance prediction tool for metagenomic datasets. Responsibilities include co-ordination of a project involving 3 universities and several national public health and agrifood stakeholders.

Associate Research Fellow — **University of Exeter**
Living Systems Institute — *October 2016–January 2017*
Supervisor: Thomas A. Richards
Projects performed included experimental induction of RNAi in *P. bursaria*, automation of genome assembly using Bayesian optimisation, and analysis of protein transmembrane domain evolution with deep recurrent neural networks.

Competitive Machine Learning Team — **University of Edinburgh**
Neurogylcerin — *August 2014–March 2016*
- National Data Science Bowl II: estimation of cardiac ventricular volume from MRI videos and deep recurrent neural networks.
- National Data Science Bowl: image classification of plankton via model averaging of several deep convolutional neural networks. These networks used hierarchical labels, online image augmentation, and conventional visual feature extraction.
- American Epilepsy Society Seizure Prediction Challenge: classification of pre-seizure iEEGs from normal brain activity using an ensemble of random forest models trained on a range of signal analysis features.

NASA Researcher — **John F. Kennedy Space Center**
Exposing Microbes in the Stratosphere Project — *July–October 2013*
Supervisor: David J. Smith
Performed ground-based trials for investigating the transcriptomic response to high UV-C flux exposure in *Bacillus*. Assisted with the design and construction of an atmospheric microbe exposure and sampling apparatus for high-altitude weather balloons.

BBC Scientific Consultant — **John F. Kennedy Space Center**
Cloud Lab Documentary — *October 2013*
Acted as NASA representative and scientific advisor for the British Broadcasting Company documentary on atmospheric sciences. Developed microbial sampling and exposure protocols and briefed the cast and producers on the relevant microbiological background.

Undergraduate Researcher — **University of Exeter**
SGM Harry Smith Studentship — *June–August 2010*
Funded summer honours research project (9 weeks) on the evolution of folate biosynthesis gene fusions within the eukaryotes.

Teaching Experience

Bioinformatics Algorithms (CSCI6802) | **Dalhousie University**
Guest Lecturer on Phylogenetic Statistics | *March 2018*

Data Management (INFO6540) | **Dalhousie University**
Guest Lecturer on Statistical Data Formats | *February 2018*

Adult Literacy Network | **North Memorial Library**
GED Tutor | *January 2018–Present*

International Course on Antibiotics and Resistance | **Annecy, France**
Assistant Bioinformatics Tutor | *November 2017*

Introduction to Python and Advanced Python | **University of Exeter**
Assistant Instructor | *January–March 2016*

Machine Learning for the Life Sciences | **University of Exeter**
Lecturer | *June 2016*

Bioinformatics for Genomics | **University of Exeter**
Assistant Instructor | *February 2015*

Unix and Perl | **University of Exeter**
Assistant Instructor | *October 2014*

Image Processing with Python | **University of Exeter**
Assistant Instructor | *September 2014*

Software Carpentry Bootcamp | **University of Exeter**
Teaching Assistant | *November 2013*

Supervision Experience

Undergraduate Honours Supervisor | **Dalhousie University**
Department of Biology | *October 2018–Present*
Supervision of an undergraduate honours student analysing patterns of AMR in a large set of metagenome assembled genomes.

NSERC Summer Research Supervisor | **Dalhousie University**
Faculty of Computer Science | *July–August 2018*
Supervision of an NSERC Undergraduate Research Assistant in developing machine learning models for predicting rRNA gene related AMR resistance.

Machine Learning Consultancy | **Dalhousie University**
Team Coordinator | *June–September 2018*
Supervised 2 PhD students on an industry partnership consultancy applying machine learning to time-sheet programs.

Bioinformatics Consultancy | **Dalhousie University**
Team Coordinator | *July–November 2017*
Supervised 2 PhD students performing microbial genomic analyses for a clinical microbiome project.

Nuffield Foundation Supervisor | **University of Exeter**
High School | *January–March 2016*
Co-supervision of a high school student from a deprived area doing research on the evolution of endosymbiotic algae.

Undergraduate Honours Supervisor | **University of Exeter**
Biosciences | *November–December 2014*
Supervision of an honours project performing phylogenetic analysis of the components of the RNAi system of *Paramecium*.

Undergraduate Honours Supervisor | **Natural History Museum**
Microbiology | *June–October 2013*
Supervision of a visiting research student registered at the University of Oxford involving the bioinformatic analysis of horizontal gene transfers of arsenate resistance.

Professional Experience

Reviewer   **Current Biology**

Pre-Publication Peer Review   *February 2014–Present*

Performed reviews for: Current Biology, BMC Genomics, PLoS Computational Biology, GigaScience, Communications Biology, MSystems, and, Bioinformatics

Publications

Published

o Leonard, G., Labarre, A., Milner, D. S., Monier, A., Soanes, D., Wideman, J. G., **Maguire, F.**, Stevens,S., Sain, D., Grau-Bové, X., et al. Comparative genomic analysis of the 'pseudofungus' hyphochytrium catenoides. *Open biology* 8, 1 (2018), 170-184

o Richards, T. A., Leonard, G., Mahé, F., del Campo, J., Romac, S., Jones, M. D., **Maguire, F.**, Dunthorn,M., De Vargas, C., Massana, R., et al. Molecular diversity and distribution of marine fungi across 130 european environmental samples. *Proc. R. Soc. B* 282, 1819 (2015), 20152243

o Chambouvet, A., Gower, D. J., Jirk, M., Yabsley, M. J., Davis, A. K., Leonard, G., **Maguire, F.**, Doherty-Bone, T. M., Bittencourt-Silva, G. B., Wilkinson, M., et al. Cryptic infection of a broad taxonomic and geographic diversity of tadpoles by perkinsea protists. *Proceedings of the National Academy of Sciences* 112, 34 (2015), E4743–E4751

o Smith, D. J., Thakrar, P. J., Bharrat, A. E., Dokos, A. G., Kinney, T. L., James, L. M., Lane, M. A.,Khodadad, C. L., **Maguire, F.**, Maloney, P. R., et al. A balloon-based payload for exposing microorganisms in the stratosphere (e-mist). *Gravitational and Space Research* 2, 2 (2014)

o **Maguire, F.**, Henriquez, F. L., Leonard, G., Dacks, J. B., Brown, M. W., and Richards, T. A. Complex patterns of gene fission in the eukaryotic folate biosynthesis pathway. *Genome Biology and Evolution* 6, 10 (2014), 2709–2720

o **Maguire, F.**, and Richards, T. A. Organelle evolution: A mosaic of 'mitochondrial' functions. *Current Biology* 24, 11 (2014), R518–R520

o Chambouvet, A., Berney, C., Romac, S., Audic, S., **Maguire, F.**, De Vargas, C., and Richards, T. A. Diverse molecular signatures for ribosomally 'active' perkinsea in marine sediments. *BMC Microbiology* 14, 1 (2014), 110

Submitted

o Wideman, J.G., Monier, A., Rodriguez-Martinex, R., Leonard, G., Cook, E., Poirier, C., **Maguire, F.**, Milner, D., Moore, K., Santoro, A.E., Keeling, P.J., Worden A.Z., Richards, T.A. Targeted single-cell sequencing of heterotrophic flagellates identifies novel mitochondrial genome diversity.

o Chambouvet, A., Monier, A., del Campo, J., **Maguire, F.**, Itoiz, S., Edvarsen, B., Ekreim, W., Richards, T.A. Cryptic intracellular infection of ecologically important diatom species by a distinct Opisthosporidia (Holomycota) lineage

Manuscripts in Preparation

o **Maguire, F.**, Attiq, M., Moussa, D.S., Beiko, R.G. Predicting the phenotypic antimicrobial resistance from genomic determinants using machine learning in Broiler Chicken derived Salmonella.

o Tsang, K., Alcock, B., **Maguire, F.**, McArthur A. Machine learning provides vital clues for linking AMR genotypes to phenotypes in ESKAPE pathogens.

o **Maguire, F.**, Alcock, B., McArthur A., Brinkman, F., Beiko, R.G. AMRtime: Rapid accurate prediction of AMR determinants from metagenomic data.

o **Maguire, F.**, Alcock, B., McArthur A., Brinkman, F., Beiko, R.G. Systematic failures in standard AMR PCR primers to detect divergent AMR alleles.

o Hall, M.W., **Maguire, F.**, Beiko, R.G. Bridging the gulf: ANI discontinuities as the product of systemic biases

o **Maguire, F.**, Attiq, M., Moussa, D.S., Beiko, R.G. Large scale genomic analysis of chicken derived non-typhoidal Salmonella.

o **Maguire, F.**, Alcock, B., McArthur A., Brinkman, F., Beiko, R.G. Comparative analysis of metagenomic

search methods for AMR.

Conferences

Oral Presentations

Joint Departmental Seminar   **Universities of Auckland and Waterloo**
Remote presentation   *19 October 2018*
AMRtime: Rapid Accurate Identification of Antimicrobial Resistance Determinants from Metagenomic Data

American Society of Microbiology   **Washington, DC**
Rapid Applied Microbial NGS and Bioinformatic Pipelines Conference   *23–26 September 2018*
AMRtime: Rapid Accurate Identification of Antimicrobial Resistance Determinants from Metagenomic Data

Integrated Rapid Infectious Disease Analysis   **National Microbiology Labs, Winnipeg**
Annual General Meeting   *22 June 2018*
Using Machine Learning Methods to Accurately Classify AMR in Metagenomic Data

Dalhousie Computer Science In-House Conference   **Dalhousie University**
Departmental Conference   *24–26 January 2018*
BayeHem: Bayesian Optimisation of Genome Assembly

International Course on Antibiotics and Resistance   **Annecy, France**
Workshop   *11–19 November 2017*
Understand and Using the Comprehensive Antibiotic Resistance Database

Canadian Institute For Advanced Research   **Toronto, ON**
Integrated Microbiology Meeting   *1–5 June 2016*
An Analysis of RNAi Pathway Components and Function in *Paramecium*

Machine Learning for Life Sciences   **University of Exeter**
Workshop   *2nd June 2015*
Casting a Deep Net: Classifying Plankton from Shadowgraph Images

Machine Learning for Life Sciences   **University of Exeter**
Workshop   *1st June 2015*
Stumbling Over the Decision Boundary

European Molecular Biology Organisation   **EMBO Heidelberg**
Young Investigators Program   *2–7 December 2013*
Endosymbiont Proteins Implicated in the Maintenance of the Photosynthetic Endosymbiosis between *Paramecium bursaria* and *Chlorella*

National Association for Research in Science Teaching   **Indianapolis, IN**
Presented in Absentia   *25–28th March 2012*
Working on the Public's Perception and Understand of Science and Scientists through a Popular, Open-Access 'AskScience' Website

Tennessee Maths and Science Education Research Conference   **Murfreesboro, TN**
Presented in Absentia   *2–3rd February 2012*
Online Conversations as a Way of Understanding the Public's Views of the Natural of Science: Research on Reddit's 'AskScience'

Poster Presentations

Consortium of Universities for Global Health   **Chicago, IL**
Translation and Implementation for Impact in Global Health Conference   *8–10 March 2019*
Halifax Newcomer Well Woman Clinic: Promoting the Health of Refugee Women Through Advocacy and Partnership

Canadian Society of Microbiology   **University of Manitoba**
Summer Conference   *18–21 June 2018*
The Cost of Speed: Evaluating Systematic Failures in Metagenomic AMR Profiling

School of Informatics Jamboree   **University of Edinburgh**
Departmental Conference   *26 March 2015*
Classifying Plankton Species with Deep Learning and Computer Vision

European Molecular Biology Organisation	**EMBO Heidelberg**
Young Investigators Program	*2–7th December 2013*
Key Principles in Molecular Phylogenetics	

European Molecular Biology Organisation	**Sant Feliu de Guixols, Spain**
Comparative Genomics of Eukaryotic Microorgamisms Conference	*19–24th October 2013*

Endosymbiont Proteins Implicated in the Maintenance of the Photosynthetic Endosymbiosis between *Paramecium bursaria* and *Chlorella*

Systematics Association	**Natural History Museum, London**
Young Systematists Forum	*1st December 2011*
Folate Biosynthesis Gene Fusion Evolution in the Eukaryotes	

Society for General Microbiology	**University of York**
Summer Conference	*5–7th September 2011*
Evolution of Folate Biosynthesis Gene Fusion in the Eukaryotes	

European Molecular Biology Organisation	**Sant Feliu de Guixols, Spain**
Comparative Genomics of Eukaryotic Microorgamisms Conference	*15–20th October 2011*
Evolution of Folate Biosynthesis Gene Fusions in the Eukaryotes	

Academic Associations

- American Society of Microbiology
- Canadian Society of Microbiology
- Dalhousie Postdoctoral Union
- International Society of Infectious Disease
- British Phycological Society
- Universities and Colleges Union

References

- Robert G. Beiko, Canada Research Chair in Bioinformatics, Faculty of Computer Science, Dalhousie University (Postdoctoral supervisor), E-mail: beiko@cs.dal.ca
- Andrew McArthur, Cisco Research Chair in Bioinformatics, Department of Biochemistry and Biomedical Sciences, McMaster University (Collaborator), E-mail: mcarthua@mcmaster.ca
- Thomas A. Richards, Chair of Evolutionary Genomics, Living Systems Institute, University of Exeter (PhD supervisor), E-mail: T.A.Richards@exeter.ac.uk