

# FINLAY MAGUIRE

## ACADEMIC ADDRESS

Natural History Museum  
Cromwell Road  
London  
SW7 5BD  
+44 (0)20 7942 6322  
richardslab.exeter.ac.uk

## HOME ADDRESS

43 Blackboy Road  
Exeter  
EX4 6SZ  
+44 (0)77 6989 5717  
root@finlaymagui.re  
finlaymagui.re

## EDUCATION

**A Multi-omic Analysis of the Photosynthetic Endosymbioses of *Paramecium bursaria***  
**Doctor of Philosophy (pending viva)**  
**Natural History Museum**  
**University College London**

October 2011 - Present

Joint institution PhD in Molecular Evolution/Bioinformatics on the reconstruction of cellular interactions in a nascent endosymbiotic system. This research was co-supervised by Professor Max Telford (EMBO YIP 2000) at University College London and Dr Thomas Richards (EMBO YIP 2012) at the Natural History Museum. Project was completed as a sitting scientist at the University of Exeter where Dr Richard's lab is now located.

This research involved the development of novel machine learning and bioinformatic methods to analyse single cell genomic and transcriptomic datasets. This PhD represents the first use of these datasets in the study of non-model multi-eukaryote systems. Additionally, this work included extensive phylogenomic analyses and the use of mass spectrometry data to recapitulate the metabolome of *P. bursaria* and its algae.

**Master of Arts (Honours) Natural Science - Biological Sciences**  
**Oxford University**

October 2008 - June 2011

Honours schools: Cellular & Developmental Biology and the Biology of Plant & Animal Disease  
During this degree I conducted the following independent research:

- The evolution of the folate biosynthesis gene fusions in the eukaryotes (supervised by Dr Thomas Richards) (now published - see publications section below for full citation).
- Explaining the functional diversity of leucine rich repeats (supervised by Dr Adrian Smith).
- A proposal to investigate the exchange of proteins between *Ignioccoccus hospitalis* and *Nanoarchaeum equitans* (supervised by Professor Ian Moore).

## SHORT TERM PROJECTS

**National Data Science Bowl I**

December 2014 - March 2015

Participated in a Kaggle machine learning competition on the image classification of plankton images into 121 classes. Formed part of 6-person team with PhD students from University of Edinburgh. Placed in top ~ 5% of teams (57/1049) by model averaging several GPU-accelerated deep convolutional neural network models trained using online image augmentation and supplemented with conventional visual feature extraction and hierarchical label classification data.

**American Epilepsy Society Seizure Prediction Challenge**

August - October 2014

Participated in a Kaggle machine learning competition trying to differentiate pre-seizure iEEGs from normal brain activity as part of 3-person team with PhD students from University of Edinburgh. Placed in the top 5% of teams (16/527) using an ensemble of random forest models trained on a range of signal analysis features e.g. multivariate autoregression models and frequency power bands.

**National Data Science Bowl II**

December 2015 - March 2016

Participated in a Kaggle machine learning competition aiming to estimate left ventricular volume of a heart at systole and diastole from 3D MRI videos as part of 3-person team with PhD students from University of Edinburgh. This regression problem solution involved GPU-accelerated deep recurrent neural network models.

**NASA Planetary Biology Program**

July - October 2013

Funded short term research fellowship (10 weeks) with Dr David J. Smith at the Space Life Science Laboratories of NASA's John F. Kennedy Space Centre working on the MIST project. This project involved investigating transcriptomic adaptations of *Bacillus* species to stratospheric conditions as well as sampling microbes in the stratosphere.

**BBC Cloud Lab Documentary**

October 2013

Acted as NASA representative and scientific adviser for the British Broadcasting Company (BBC) 'Cloud Lab' documentary on atmospheric sciences. In this role I created microbial sampling and exposure protocols as well as assembling the necessary materials and airship fixtures to conduct these experiments. I additionally briefed Dr Jim McQuaid (University of Leeds) and producers on the relevant microbiological background.

**Society for General Microbiology Harry Smith Vacation Studentship** June - August 2010

Funded summer research project (9 weeks) with Dr Thomas Richards at the University of Exeter on the evolution of folate biosynthesis gene fusions in the eukaryotes.

**BioMAP Egypt**

July - August 2008

Research assistant (5 weeks) on the BioMAP GIS project monitoring biodiversity in the Sinai desert in association with the University of Nottingham and the Suez Canal University.

**AWARDS AND GRANTS****School of Informatics Jamboree Prize**

26th March 2015

University of Edinburgh

Poster Competition Prize

**NASA Planetary Biology Program**

July - October 2013

John F. Kennedy Space Centre

Competitive award which funded a short term (10 week) research fellowship with Dr David J. Smith at NASA Kennedy Space Centre on bacterial adaptations to extreme conditions (£3500).

**Earth and Space Foundation Exploration Award**

2013

John F. Kennedy Space Centre

Awarded for work conducted at NASA Kennedy Space Centre with Dr David J. Smith in the use of terrestrial environments to advance the exploration of space (£300).

**FEMS Young Scientist Meeting Grant**

19th-24th October 2013

Sant Feliu de Guixols, Spain

Federation of European Microbiological Societies (FEMS) grant to attend and present at the European Molecular Biology Organisation (EMBO) conference: Comparative Genomics of Eukaryotic Microorganisms 2013 (£350).

**FEMS Young Scientist Meeting Grant**

15th-20th October 2011

Sant Feliu de Guixols, Spain

Federation of European Microbiological Societies (FEMS) grant to attend and present at the European Molecular Biology Organisation (EMBO) conference: Comparative Genomics of Eukaryotic Microorganisms 2011 (£350).

**Society for General Microbiology Undergraduate Student Grant**

5th-7th September 2011

University of York

Grant for travel and accommodation to attend and present at the Society for General Microbiology (SGM) Summer 2011 conference at the University of York (£170).

**Dukinfield Exhibition in Biological Sciences**

October 2009-July 2011

Somerville College, Oxford

Awarded and maintained throughout my undergraduate degree for academic excellence (£300).

**Society for General Microbiology Harry Smith Vacation Studentship**

June 2010-August 2010

University of Exeter

Award funding a summer research project with Dr Thomas Richards at the University of Exeter on the evolution of folate biosynthesis gene fusions in the eukaryotes (£1890).

## PUBLICATIONS

### **“Complex patterns of gene fission in the eukaryotic folate biosynthesis pathway.”**

Maguire, F., Henriquez, F.L., Leonard, G., Dacks, J.B., Brown, M.W., Richards, T.A.  
Genome Biology and Evolution 6, 2709-2720, 2014

### **“Organelle Evolution: A Mosaic of ‘Mitochondrial’ Functions”**

Maguire, F., Richards, T.A.  
Current Biology 24(11), R518-R520, 2014

### **“Relative iEEG Feature Importance in Seizure Prediction”**

Gray, G., Lowe, S., Maguire, F.  
*In preparation*

### **“Diverse molecular signatures for ‘active’ Perkinsea in marine sediments”**

Chambouvet, A., Berney, C., Romac, S., Audic, S., Maguire, F., de Vargas, C., Richards, T.A.  
BMC microbiology 14(1), 110, 2014

### **“A Balloon-Based Payload for Exposing Microorganisms in the Stratosphere (E-MIST)”**

Smith, D.J., Thakrar, P.J., Bharrat, A.E., Dokos, A.G., Kinney, T.L., James, L.M., Khodadad, C.L.,  
Maguire, F., Maloney, P.R., Dawkins, N.L.  
Gravitational and Space Research 2 (2), 2014

### **“Cryptic infection of a broad taxonomic and geographic diversity of tadpoles by Perkinsea protists”**

Chambouvet, A., Gower, D.J., Jirku, M., Yabsley, M.J., Leonard, G., Maguire, F., Bittencourt, G., Wilkin-  
son, M., Richards, T.A.  
Proceedings of the National Academy of Sciences, USA, 10 August 2015

### **“Molecular Diversity and Distribution of Marine Fungi Across 130 European Environmental Samples”**

Richards, T.A., Leonard, G., Mahe, F., del Campo, J., Jones, M.D.M., Maguire, F., Dunthorn, M., Vargas,  
C., Massana, R., Chambouvet, A.  
Proceedings of the Royal Society B 282 (1819) 20152243

## CONFERENCES AND WORKSHOPS

### **Workshop on Gaussian Processes for Global Optimisation**

Participant

17th September 2015  
University of Sheffield,  
Sheffield, United Kingdom

### **Gaussian Process Summer School 2015**

Participant

14-16th September 2015  
University of Sheffield,  
Sheffield, United Kingdom

### **Introduction to Machine Learning for Life Sciences Workshop**

Invited Talk: “Stumbling Over the Decision Boundary”  
Invited Talk: “Casting a Deep Net: Classifying Plankton from Images”

1st-2nd June 2015  
University of Exeter, Cornwall  
Tremough, United Kingdom

### **School of Informatics Jamboree 2015**

Poster presentation: “Classifying Plankton Species with Deep Learning  
and Computer Vision”  
Graham, M., Gray, G., Lowe, S., Maguire, F., Selega, A., Stanciu, D.  
(*Presented in absentia*).

26th March 2015  
University of Edinburgh,  
Edinburgh, United Kingdom

### **EMBO YIP PhD Course**

European Molecular Biology Organisation Young Investigator  
PhD course participant.  
Oral presentation: “Key endosymbiont proteins implicated in the  
maintenance of the photosynthetic endosymbiosis between *Paramecium bursaria*  
and *Chlorella*”  
Poster presentation: “Key principles in molecular phylogenetics”

2nd-7th December 2013  
EMBL,  
Heidelberg, Germany

**EMBO: Comparative Genomics of Eukaryotic Microorganisms**

19th-24th October 2013  
Sant Feliu de Guixols, Spain

Poster presentation: “Key endosymbiont proteins implicated in the maintenance of the photosynthetic endosymbiosis between *Paramecium bursaria* and *Chlorella*”.

**Molecular Evolution Workshop**

22nd July - 1st August 2012  
MBL, Woods Hole  
MA, USA

Participant on this competitive and internationally renowned course.

**National Association for Research in Science Teaching**

25th-28th March 2012  
Indianapolis, IN, USA

Oral presentation: “Working on the Public’s Perception and Understanding of Science and Scientists through a Popular, Open-access ‘AskScience’ Website”  
de la Rubia, L.A., Marus, S., Maguire, F.  
(*Presented in absentia*).

**Tennessee Maths and Science Education Research Conference**

2nd-3rd February 2012  
Murfreesboro, TN, USA

Oral presentation: “Online Conversations as a Way of Understanding the Public’s Views of the Nature of Science: Research on Reddit’s ‘AskScience’ ”  
de la Rubia, L.A., Marus, S., Maguire, F.  
(*Presented in absentia*)

**Systematics Association: Young Systematists Forum**

1st December 2011  
Natural History Museum

Poster presentation: “Folate Biosynthesis Gene Fusions Evolution in the Eukaryotes”.

**Society for General Microbiology Summer Conference**

5th-7th September 2011  
University of York, UK

Poster presentation: “Evolution of Folate Biosynthesis Gene Fusions in the Eukaryotes”.

**EMBO: Comparative Genomics of Eukaryotic Microorganisms**

15th-20th October 2011  
Sant Feliu de Guixols, Spain

Poster presentation: “Evolution of Folate Biosynthesis Gene Fusions in the Eukaryotes”.

**TEACHING AND SUPERVISION**

- Wellcome Trust Biomedical Informatics Hub Introduction to Python and Advanced Python (January-March 2016)
- Introduction to Machine Learning for the Life Sciences Workshop (June 1st-2nd 2015)
- Wellcome Trust ISSF Genomics Course (February 4th-25th 2015)
- Wellcome Trust Biomedical Informatics Hub Unix and Perl Course (October 2014-July 2015)
- Co-supervision of final year undergraduate project at University of Exeter identifying components of the RNAi system in *Paramecium bursaria* (November-December 2014)
- Wellcome Trust Biomedical Informatics Hub Image Processing with Python Workshop (18th-19th September 2014)
- Software Carpentry Exeter Bootcamp (14th-15th November 2013)
- Supervision of a visiting summer research student registered at the University of Oxford. The project involved bioinformatic analysis of arsenate resistance HGTs. (June-October 2013)

**OUTREACH**

Moderator of the “AskScience” science education forum with over 15 million monthly views and 250,000 unique visitors per day.

**TECHNICAL SKILLS**

- Expert with UNIX/Linux, Zsh/Bash, Python, Awk, Git, L<sup>A</sup>T<sub>E</sub>X
- Intermediate with R, C, C++, perl, matlab, high-performance linux system administration, statistics and machine learning
- Several open source contributions to projects primarily involving python and C++
- Basic knowledge of Javascript (including D3.js), CSS, Nim, Verilog, Prolog, Go
- Extensive domain specific knowledge in bioinformatics: transcriptomics, molecular evolution/phylogenetics, genomics, metabolomics, sequence analysis, annotation
- Familiarity with an array of basic molecular and microbiological techniques and methodologies: PCR, culturing, cloning, sequencing technologies, microscopy.
- Completed massively open online courses (MOOC) in: machine learning, mathematical logic, linear algebra, algorithms, databases, probabilistic graphical models, statistics, data analysis, automata theory, functional analysis, and music theory