

Rebecca R. Murphy, BA (Hons), MSci.

CONTACT INFORMATION

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EDUCATION

Oct. 2011 – June 2015 PhD programme in single molecule biophysics,
Department of Chemistry, University of Cambridge, UK

Doctoral supervisors: Dr Sophie E. Jackson and Prof. David Klenerman, FRS

- Developed **Monte-Carlo sampling methods** to analyse photon bursts from fluorescently labelled biomolecules (experimental technique: single-molecule FRET), including protein aggregation data.
- Optimized algorithms for efficient analysis of large datasets (more than **1 million data points**).
- **Implemented Python library** for single photon counting applications, including statistical analysis and data visualisation.
- Developed automated tools for selecting fluorescence labelling sites in proteins.
- Expertise in site-specific protein labelling; single-molecule fluorescence microscopy; confocal laser optics.

Oct. 2007 – June 2011 MSci Natural Sciences (Chemistry),
Department of Chemistry, University of Cambridge, UK

MSci Thesis *Single-molecule fluorescence studies of Blue Fluorescent Protein*

- 2011 Part III, Natural Sciences (Chemistry), Grade: *2:1*
- 2010 Part II, Natural Sciences (Chemistry), Grade: *1st*
- 2009 Part IB, Natural Sciences (Biochemistry, Chemistry), Grade: *1st*
- 2008 Part IA, Natural Sciences (Biochemistry, Chemistry, Physiology, Mathematics), Grade: *1st*

Sept. 2005 – June 2007 Secondary Education, **Wheatley Park School**, Oxfordshire, UK
5 A-Levels at Grade A: Biology, Chemistry, Mathematics, English Literature, History.

EMPLOYMENT HISTORY

July 2014 – Sept. 2014 Bioinformatics Intern
Illumina, Cambridge

Developing anomaly detection methods for *de novo* assemblies of bacterial genomes from NGS reads.
Probabilistic modelling of Nextera mate-pair library insert sizes using Python.
Use of SGE Cluster for rapid data processing.

April 2014 – July 2014 Freelance Data Analyst
Aptivate, Cambridge

Data visualisation and interpretation for an NGO. Maternal health and citizen engagement demographics.

2011 – present Teaching Assistant for undergraduate chemistry degree
Department of Chemistry, University of Cambridge

Taught seminars and practical classes on protein folding and organic/inorganic synthesis.

June 2010 – Sept. 2010 Summer Research Project under Prof. Shankar Balasubramanian FRS
Cancer Research Institute, Cambridge

Investigating the regulatory role of DNA quadruplex structures in gene expression.

June. 2009 – Sept. 2009 Summer Research Project under Dr Sophie E. Jackson
Department of Chemistry, University of Cambridge

The interaction between bioactive compound 4-HNE and Parkinson's disease implicated protein UCH-L1.

BIOINFORMATICS SKILLS

PROGRAMMING LANGUAGES AND TOOLS

Experience with tools for the **NGS pipeline**, including SPAdes, Velvet, BWA, Quast, Samtools and IGV.
3 years' experience using **Python** for scientific computing and data visualisation, including numpy, scipy and matplotlib libraries.

Expertise in **Matlab**, **bash** and **R** programming environments.
Basic understanding of **C++** and **javascript** programming languages.

TRAINING

Expertise in **Bayesian statistics** and **sampling methods for data analysis**.

Completed **Pavel Pevzner's Coursera programme on Bioinformatics Algorithms** (Python) achieving distinction.

- Implementation of algorithms to solve bioinformatics problems (included DNA sequencing; motif-finding; directed acyclic graphs for global and local sequence alignment; sequence assembly from De Bruijn graphs; break-point graphs; suffix tries and the Burrows-Wheeler transform).

Completed **Andrew Ng's Coursera programme on Machine Learning** (Matlab) achieving 100%

- Supervised and unsupervised learning algorithms; linear and logistic regression; neural networks; support vector machines; clustering algorithms; dimensionality reduction; recommender systems.

Completed **Tim Roughgarden's Coursera programme on Design and Analysis of Algorithms**, Parts I (89 %) and II (89.6 %).

- Key algorithmic paradigms: dynamic programming, recursive algorithms including divide and conquer strategies, greedy algorithms, graph-search algorithms.

PUBLICATIONS AND TALKS

Rebecca R. Murphy, George Danezis, Mathew H. Horrocks, Sophie E. Jackson and David Klenerman. Bayesian Inference of Accurate Intramolecular Distances from Single Diffusing Biomolecules. *Anal. Chem.* 2014, 86, 8603-8612

pyFRET: A Python Library for Analysis of Single Molecule Fluorescence Data. *Euroscopy* 2014.

Rebecca R. Murphy, Jared O'Connell, Anthony J. Cox and Ole Schulz-Trieglaff. NxRepair: Error correction in de novo sequence assembly using Nextera mate pairs. *In prep.*

Elizabeth F. Werrell, William J.K. Crone, Rebecca R. Murphy, Shang-Te Danny Hsu and Sophie E. Jackson. Oxidative damage to the Parkinsons Disease associated protein UCH-L1 exposes a hidden partially unfolded state. *In prep.*

SKILLS AND EXPERIENCE

POSITIONS OF RESPONSIBILITY

Supervised **three undergraduate research projects** (summer 2012, summer 2013 and autumn 2013 – present):

- Designed short research projects for three students; secured project funding; managed training and daily supervision.

Graduate member of departmental Athena Swan working group (Oct. 2012 – present):

- Designed, implemented and analysed online survey of departmental graduate population; contributed report to submission earning a departmental Athena Swan award (bronze).

President of Cambridge University Chemical Society (July 2009 - July 2010):

- Organised talks and panel discussions, drawing over 100 attendees to popular events.

COMMUNICATION SKILLS

Poster presentations at two international conferences; frequently present research in internal seminars.

Science feature writer for student newspaper *Varsity* (Sept. 2013. – Dec. 2013); writer and associate editor for science magazine *The Triple Helix* (Oct. 2009 – May 2010):

LANGUAGE SKILLS

English (native), French (conversational, CEFR Level B2), German (intermediate, CEFR Level B1).

OTHER INTERESTS

Sport: I enjoy distance running and triathlon. In 2013 I completed three triathlons and a half-marathon.

Volunteering: Family Support Volunteer with Cambridgeshire Mencap (Sept 2011 – present). Weekly appointment caring for a child with an autistic spectrum disorder.

REFEREES

Dr Ole Schulz-Trieglaff
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Prof. David Klenerman (PhD Supervisor)
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