Nicholas J. Fowler

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A highly analytical and creative computational biophysicist with expertise in applying ideas from different fields to solve challenging scientific problems.

🎓 Education

PhD Biophysics, University of Manchester	2014–2018
MSc Physics, University of Manchester	2012–2014
PGCE Physics Secondary, University of Manchester	2011–2012
BSc Physics, University of Manchester	2007–2010

💼 Experience

Research Associate, The University of Leicester   2021–2022
- Led a small team to design a computational method for finding elusive drug-binding protein conformations using easily acquired nuclear magnetic resonance (NMR) data.
- Worked with the Collaborative Computational project for NMR (CCPN) team to integrate one of my computational methods (ANSURR - see below) into the widely used CCPN-analysis software.

Research Associate, The University of Sheffield   2018–2021
- Developed the first reliable method for validating the accuracy of NMR protein structures (ANSURR - Accuracy of NMR Structures Using RCI and Rigidity).
- Trained a deep neural network (TensorFlow) to improve ANSURR scoring by accounting for the type of protein being validated.
- Built a webserver (ansurr.com) to share ANSURR output for all NMR protein structures solved to date.
- Applied ANSURR to identify a common issue with many existing NMR protein structures (a lack of hydrogen bonds) and devised a new combined experimental/computational approach to address it.

PhD student, The University of Manchester   2014–2018
- Developed a computational method to screen the effect of mutations of a copper protein with potential biotechnological applications in enzyme catalysed fuel cells.
- Gained experience performing molecular simulations at different levels of theory: quantum mechanics, density functional theory, molecular dynamics and continuum electrostatics.
- Optimised molecular biology and electrochemistry experiments to test and refine computational predictions.
- Programmed bioinformatics pipelines to process large sequence and structural datasets to investigate the biophysical properties of post-translational modification sites at the proteomic scale.

Teacher of Science (Part time), Loreto High School, Manchester   2012–2014
- Taught physics, chemistry and biology, graded "Outstanding" by Ofsted criteria.
- Devised and delivered weekend workshops for non-physics specialists on how to teach physics.

⚙ Skills

Computational and programming skills
- Experienced in Linux/Unix environments, command line and shell scripting.
- Proficient programming in Python and Bash and have experience using C++, R, HTML, VBA, SQL.
- Develop code using Jupyter lab, manage code using Git and release code as PyPi packages (e.g. pypi.org/project/ansurr, pypi.org/project/pdb2af, pypi.org/project/nerrds).
- Confident using high performance computing (SGE, Slurm, HTCondor).
- Built websites/webservers (Flask, LAMP), hosted using virtual servers.
- At Sheffield, maintained a network of 12 Linux machines which involved administering user accounts, automating back-ups and software/hardware installation.

Problem solving
- My computational method ANSURR solves the long-standing problem of how to validate an NMR protein structure when there isn't enough data to fully solve it in the first place. Required a creative solution combining approaches from chemistry, mathematics and bioinformatics. I'm currently in discussions with the Worldwide Protein Data Bank on how they can implement ANSURR as the standard way to validate all NMR protein structures.
- Identified that the code written by PhD student I supervised was not able to achieve the simulation time required. Recommended a training course on code parallelisation and supported them to rewrite the code so it ran 1000x faster and could then be used to test our hypothesis.

Communication
- Awarded 8 prizes for oral and poster presentations at scientific conferences. Some examples of my talks can be found here: youtu.be/ZDPdHstdiac?t=752, youtu.be/B0adnBxkl98?t=767.
- As a Widening Participation fellow (2014-2018), I created and delivered workshops, talks and tutorials for diverse audiences including at University events, schools and science festivals. In 2015, I received a "Making a Difference" award for outstanding contribution to public engagement.
- Worked freelance as a motivational speaker (2016-2018) to encourage students from all backgrounds to consider higher education.

Leadership
- Organised and chaired fortnightly International Council on Magnetic Resonance in Biological Systems webinars. Hosted over 70 speakers from 5 different continents and provided networking opportunities for early career researchers during coronavirus lockdowns.
- Secured funding from the Physics of Life Network for an undergraduate physics student to undertake a research project I designed and supervised. She presented her results at the Royal Society and has gone on to pursue a PhD in computational biology.
- Mentored a student during his A levels and physics degree at the University of Oxford. They are soon to finish their PhD at the University of Bristol.
- Trained and managed teams of "science buskers" to promote curiosity about science with attendees of science events and festivals.

📓 Hobbies and interests

- Programming science-based games.
- Playing tabletop games and using machine learning approaches to analyse data relating to them.
- Walking and bird watching.