Jim Downie

Curriculum Vitae

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I am a statistical ecologist with skills in bioinformatics, Bayesian modelling, and microbial community analysis. For the past three years, I have been working as a postdoctoral researcher at Bangor University, leading a landscape-scale study of the oak microbiome using both amplicon sequencing and metagenomic shotgun approaches.

I am a motivated and fast learner who is always keen to learn new skills, and during my postdoc I have taught myself pipeline development using Nextflow and targets. I am a active member of the nf-core project, and a major contributor to the nf-core/mag metagenomic binning pipeline, as well as developing several modules for the general repository. I have greatly enjoyed developing these skills and tools, and am looking for work that will allow me to deepen my skills in these areas.

Education

2016–2020 **PhD, Evolutionary ecology of pine-mycorrhizal interactions in the Caledonian pinewoods of Scotland**, *University of Edinburgh*, Centre for Ecology and Hydrology, Edinburgh.

2015–2016 **MSc Computational Methods in Ecology and Evolution**, *Imperial College London*, Merit.

2010–2014 **BSc Plant Biology**, *University of Aberdeen*, First Class Honours.

2009–2010 **HNC Software Engineering**, *Langside College*, Glasgow, Final grade: A.

Employment

2021–present **Bangor University**, *Postdoctoral researcher*, Bangor, PI: Prof. James McDonald.

Planned, co-ordinated, and conducted a UK-wide microbiome survey of 300 oak trees across the UK for microbiome metagenomic and amplicon sequencing.
Lab processing of all collected samples for shotgun metagenomic sequencing and 16S rRNA/ITS amplicon sequencing.
Developed and applied pipelines in Nextflow for bioinformatic processing (functional analysis + metagenomic binning) of resulting sequencing data.
Bayesian occupancy modelling of resulting microbial community data to predict species distributions across the UK and identify microbial taxa associated with oak disease.

2020-2021 **Mirador Analytics**, *Data scientist*, Melrose.

Analysis of large healthcare datasets to check efficacy of de-identification of individual patients.

2016–2020 **University of Edinburgh**, *PhD Researcher*, Edinburgh.

Supervisors: Prof. Jonathan Silvertown, Dr. Stephen Cavers, Prof. Richard Ennos
Planned and conducted large glasshouse trials
Bayesian analysis of large community dataset generated through Sanger sequencing
Worked as a demonstrator, teaching undergraduates programming and data analysis

2014 **University of Aberdeen**, *Field researcher*, Aberdeen.

2014 **University of Aberdeen**, *Plant ID guide studentship*, Aberdeen.

Analytical skills

Bioinformatics and data analysis.

Development of bioinformatics pipelines using Nextflow

Development of computational pipelines using targets in R

Creating and deploying Docker and Singularity containers to improve computational reproducibility

Creation of Bioconda recipes to deploy new bioinformatics software within pipelines

Analysis and processing of Illumina shotgun sequencing data, including QC, assembly, metagenomic binning, genome annotation

Analysis and processing of Illumina amplicon sequencing data

Fluent in R (base and tidyverse), working knowledge of Python

Good working knowledge of Unix systems

Management and organisation of large datasets

Version control using Git, collaborative development of software through GitHub, including code reviewing

CI/CD using Github Actions

Statistical modelling.

Strong background in statistical theory

Causal analysis using causal theory and DAGs

Development of Bayesian models (particularly mixture and measurement error models) using Stan

Bayesian workflows for iterative model design and testing

Familiarity with a wide range of packages for statistical analysis

Strong understanding of (generalised) linear mixed models

Additional skills

Collaborative skills.

Worked as part of a cross-institutional interdiscipliary team, incorporating insights from multiple fields to meet project aims

Regularly provide computational and statistical advice and informal teaching to colleagues

Mentoring of junior colleagues and students within the research group

Enjoy maintaining a friendly and helpful work environment

Creative and problem solving skills.

Coming up with creative ideas to solve problems

Approach problems from multiple angles, to see whole picture

Combining statistical and experimental techniques to address complex problems

Planning and organisational skills.

Self-motivated, strong organisational skills and able to work independently

Delivering experiments and data under tight timelines

Ability to work accurately, with attention to detail

Strong written and oral presentation skills.

Proven record of scientific writing with the ability to pitch at appropriate audience level

Effective communication of complex statistical topics to non-experts

Presented internally and externally at conferences (ISME, BES, SEECC), and lectured to local societies

Full, clean driving license.

Publications

in prep **Downie, J., et al.**, *Catalogue of oak-associated microbial genomes.*

in prep **Downie, J., et al.**, *Mapping the oak microbiome across the British landscape.*

2021 **Downie, J., et al.**, *Location, but not defensive genotype, determines ectomycorrhizal community composition in Scots pine (Pinus sylvestris L.) seedlings*, Ecology and Evolution, https://doi.org/10.1002/ece3.7384.

2020 **Downie, J., et al.**, *Heritable genetic variation but no local adaptation in a pine-ectomycorrhizal interaction*, Mycorrhiza, https://doi.org/10.1007/s00572-020-00941-3.

Training

2023 Advanced Nextflow - nf-core at Wellcome Genome Campus

2022 Shotgun metagenomics - NEOF

2020 Linux for Genomics - Edinburgh Genomics

2020 Introduction to metabarcoding - Edinburgh Genomics

Awards

2019 Second prize for best poster at the Scottish Ecology, Environment and Conservation Conference

2014 Botanical Society of Scotland Student Prize for best botanical dissertation

2014 Ede and Ravenscroft Award for Outstanding Performance in Plant Biology

Personal

Languages Fluent in English, learning Greek

Hobbies I enjoy cycling, climbing, camping, bike maintenance, weaving, reading