David Clark

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Education

University of Essex
Ph.D. Microbiology *2013–2017*

University of Essex
B.Sc. Biological Sciences, 1st Class *2010–2013*

Appointments

University of Essex
Senior Research Officer *2017–Present*

Project: PRINCe - A new dynamic for Phosphorus in RIverbed Nitrogen Cycling

Description: Porous riverbed sediments provide an important ecosystem service by cycling nitrogen from a soluble bio-available form, to an inert gas. New evidence suggests that phosphorus may determine the reaction pathways and fate of nitrogen in riverbed systems. My role as senior research officer on this project is to undertake molecular analyses of the relevant N-cycling microbial communities to determine how phosphorus, sediment structure, and microbial communities interact to process nitrogen.

Research Experience

Ph.D. Thesis: *The Macroecology of Microbes; From Pattern, to Process*

Supervisors: Dr Alex J. Dumbrell, Dr Terry J. McGenity, Prof. Graham JC. Underwood

Description: My thesis tests hypotheses on patterns of microbial diversity and distributions under the unifying theme of macroecology, using a variety of data sources and study systems. I show that the relationship between temperature and microbial diversity is not consistent, and more isolated sites show markedly different patterns. I also collected the most high-resolution dataset to date on halophilic Archaea, which I used to show that these extremophilic microbes do not conform to classic biogeographic regionalisation.

Undergraduate Dissertation: *Diversity-Productivity Relationships in Mock Microbial Assemblages*

Supervisors: Dr Alex J. Dumbrell

Description: Using mock microbial communities, I demonstrated that increasing diversity resulted in a saturating relationship with productivity (measured as biomass), indicative of functional redundancy in more diverse communities.

Publications

† denotes my four most significant publications.

- McKew, B. A., Dong, L. F., **Clark, D. R.**, Leung, G., Dumbrell, A. J., Stott, A., Nedwell, D. B. & Whitby, C. (2018). Organic Matter Mineralization and Nitrification: Ammonia-Oxidising Archaea Not Bacteria Dominate in Grassland Soils. ISME Journal. (Submitted - awaiting decision).
- Maček, I., Vodnik, D., Šibanc, N., **Clark, D. R.**, Moser, G., Müller, C. & Dumbrell, A. J. (2018). Impacts of long-term elevated atmospheric CO_2 levels on natural communities of arbuscular mycorrhizal fungi. Molecular Ecology. (Submitted - awaiting decision).
- † Alzarhani, A. K., **Clark, D. R.***, Underwood, G. J. C., ... & Dumbrell, A. J. (2018). Are Drivers of Root-Associated Fungal Community Structure Context Specific?. ISME Journal. (Revision submitted - awaiting decision). * Joint 1st author.
- † **Clark, D. R.**, Ferguson, R. M., Harris, D. N., ... & Dumbrell, A. J. (2018). Streams of data from drops of

water: 21st century molecular microbial ecology. Wiley Interdisciplinary Reviews: Water, e1280.
- † **Clark, D. R.**, Mathieu, M., Mourot, L., Dufossé, L., Underwood, J. C., Dumbrell, A. J. & McGenity, T. J. (2017). Biogeography at the limits of life: Do extremophilic microbial communities show biogeographical regionalization? Global Ecology and Biogeography, 26, 1435–1446.
- Dumbrell, A. J., Ferguson, R. M. W. & **Clark, D. R.** (2017). Microbial Community Analysis by Single-Amplicon High-Throughput Next Generation Sequencing: Data Analysis – From Raw Output to Ecology. Springer, Berlin, Heidelberg, pp. 155–206.
- † Aslam, S. N., Dumbrell, A. J., ..., **Clark, D. R.**, ... & McGenity, T. J. (2016). Soil compartment is a major determinant of the impact of simulated rainfall on desert microbiota. Environmental Microbiology, 18, 5048–5062.

Conferences

Conference Presentations

Conference: BES Annual General Meeting 2016

Title: Ecological Drivers of the Functional and Taxonomic Diversity of Salt Marsh Fungi

Conference: Biol. Sciences Graduate Forum 2016

Title: Biogeography at the Limits of Life: The Regional Distributions of Extreme Halophiles

Conference: Mol. Microbial Ecology Group 2015

Title: Metagenomics Vs Metagenetics: Revealing Hidden Diversity and Reducing Bias

Conference: BES Annual General Meeting 2015

Title: Microbial Biogeography: How Strongly Coupled Are Microbial Populations and Local Climate?

Conference Attendance

- 2016–BES Annual General Meeting. Liverpool
- 2016–Statistical Ecology Research Festival. University of Kent
- 2015–Mol. Microbial Ecology Group. Imperial College London
- 2015–BES Annual General Meeting. Edinburgh
- 2015–Norwegian Ecological Soc. “Ecological Change, Changing Ecology”. University of Bergen, Norway
- 2014–BES Macroecology. “Macro2014”. University of Nottingham
- 2014–BES Macroecology/PalAss. “Scaling the time barrier”. NHM, London
- 2013–Mol. Microbial Ecology Group. University of Essex

Outreach

Title (in press): Life in a Pinch of Salt: The Extreme World of Halophilic Microorganisms

Description: I have authored an article for Deposits magazine, a quarterly magazine aimed at amateur geologists. The article describes research conducted within the School of Biological Sciences at the University of Essex relating to the survival of halophilic microorganisms in ancient halite.

Event: Pint of Science - Colchester - 2018

Title: Life in a Pinch of Salt: The Extreme World of Halophilic Microorganisms

Title: Microbial Ecologist - Ecological musings of a microscopic kind

Description: I maintain an active blog and twitter profile which I use to network, promote my own research, and provide a range of content from commentary on scientific topics to more technical posts. My most popular post to date was viewed >900 times in one week.

Teaching Experience

Graduate Lab Assistant: I have acted as a GLA on microbiology and ecology modules, as well as residential field courses in France and Portugal. I have >100 hours experience supervising students in the laboratory, field, and computer labs. I have gained experience supervising student lead projects and marking students’ coursework.

Big Data Summer School–R Course: Due to my extensive experience with the `R` programming language, I was invited to teach on a week long introductory course for beginners at the 2015 and 2016 Big Data summer

schools. On each occasion, I planned and delivered a lecture and practical session, aimed at introducing beginners to importing data into R.

Mendeley workshop: I have been delivering Mendeley desktop referencing workshops for the past 3 years, for beginning post-graduate students. The workshops are intended to introduce Mendeley as an alternative to the costly Endnote software.

Marine and Environmental Sciences Skills Series: Recently, I have co-organised and delivered a skills session for post-graduate students and staff on modelling ecological count data. This involved collaborating in order to plan and present the seminar. We received positive feedback on this, and we plan to continue this series.

Other Duties

- **Peer Reviewer**–I have peer-reviewed articles for the journals Advances in Ecological Research, Molecular Ecology, Molecular Ecology Resources, Ecology and Evolution, Environmental Microbiology, WIREs Water, Nature Scientific Reports, as well as the Springer textbook series, "Hydrocarbon and Lipid Microbiology Protocols". My peer-review record can be viewed on my **Publons profile**.
- **R Working Group**–During my Ph.D., I planned and delivered a series of R working group sessions for post-graduate students in the ecology and environmental microbiology groups. These sessions facilitated discussion of various challanges relating to the analysis of ecological data, as well as reproducible work flows. The meetings resulted in a group Dropbox account with a large variety of resources to act as a reference library, as well as original documents authored by me.

Skills

Field: Experience of fieldwork in a range of environments from coastal mudflats, marshes, forests, and rivers. Able to sample asceptically and store samples appropriately. Work safely and efficiently both individually, and as part of a team.

Lab: Sample processing and storage, DNA extraction, PCR, Illumina DNA library preparation and sequencing, gel electrophoresis, DNA quantification, basic culture techniques, standard lab equipment (laminar flow cabinet, NanoDrop spectrophotometer, plate reader, thermocyclers, Illumina MiSeq).

Bioinformatics: Use of Linux computing environments, high-performance computers, analysis of amplicon and metagenomic data, QIIME, Mothur, stand-alone bioinformatics software, quality control DNA sequence data, OTU clustering, taxonomy assignment, data archiving.

Statistics: R programming language, ordination methods, multivariate modeling, spatial models, Bayesian methods, machine learning algorithms, species distribution modeling, GIS and mapping.

Reproducible research: Lab record keeping, use of text editors to document bioinformatic analyses, git and github code repositories, knitr and markdown for documenting analyses, LaTeXas a typesetting language.

Research dissemination: Good oral presentation skills, experience of presenting at scientific conferences, written communication within peer reviewed scientific literature, written and oral communication with non-academic audiences, social media for networking and outreach.

Other relevant: Full clean UK driving license.

References

Ref. 1
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Ref. 2
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