

# Daniel Padfield

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I am an early career ecologist who uses theory and experiments on microbes to understand how temperature alters biology across scales, from individuals to communities.

## Professional Experience

### Postdoctoral Research Fellow

September 2017 - present

Environment & Sustainability Institute, University of Exeter, Cornwall, UK

*PDRA on a standard NERC grant with Angus Buckling investigating the interplay between rapid evolution and community structure in soil bacteria*

Undertook multiple lab experiments investigating (1) the impact of abiotic conditions on rapid evolution, (2) the importance of coevolution on community coalescence, and (3) the effect of temperature on host-parasite interactions. Wrote and maintained a pipeline for the analysis of amplicon 16S sequencing data. Provided statistical advice and code for multiple members of the lab group.

## Education

### Ph.D., Biological Sciences

2013 - 17 Environment & Sustainability Institute, University of Exeter, Cornwall, UK

*The direct and indirect effects of warming on aquatic metabolism*

Combined ideas from metabolic theory with a variety of experimental approaches to further our understanding of how warming will impact photosynthesis and respiration across different temporal and organisational scales.

### MBiolSci., Zoology

2008 - 12 Animal & Plant Sciences Department, University of Sheffield, UK

*First class degree honours. Bergmann's rule in fish in the North Sea: a snapshot from a single year and a temporal perspective*

## Research Skills

Highly proficient in R, especially in handling and processing large and messy datasets

Statistical analysis in R, including Bayesian modelling using Stan

Programming in bash, including the use of bioinformatics programs

Bioinformatics (16S community sequencing, SNP calling of re-sequenced clones, and *de novo* assembly of bacterial genomes)

Reproducibility and open science (analyses and data of published projects are available on GitHub and archived on Zenodo)

Extensive experience of microbiological and laboratory techniques

Extensive experience of maintaining long-term cultures

## Publications

1. Silk, M., McDonald, R., Delahay, R., **Padfield, D.**, & Hodgson, D. (2020). CMRnet: An R package to derive networks of social networks from mark-recapture data. *Accepted in Methods in Ecology & Evolution*.

2. Castledine, M., **Padfield, D.**, & Buckling, A. (2020). Experimental (co)evolution in a multi-species microbial community results in local maladaptation. *Ecology Letters*.
3. **Padfield, D.**, Vujakovic, A., Griffiths, R., Paterson, S., Buckling, A., & Hesse, E. (2020) Evolution of diversity explains the impact of pre-adaptation of a focal species on the structure of natural microbial communities. *ISME*
4. McNicol, C. M., Bavin, D., Bearhop, S., Bridges, J., Croose, E., Gill, R., **Padfield, D.**, . . . , & Schofield, H. (2020). Postrelease movement and habitat selection of translocated pine martens *Martes martes*. *Ecology and Evolution*.
5. Castledine, M., Sierocinski, P., **Padfield, D.**, & Buckling, A. (2020) Community coalescence: an eco-evolutionary perspective. *Philosophical Transactions of the Royal Society B*, 375(1798): 20190252.
6. **Padfield, D.**, Castledine, M., & Buckling, A. (2020) Temperature-dependent changes to host-parasite interactions alter the thermal performance of a bacterial host. *ISME* 14(2): 389-398
7. **Padfield, D.**, Castledine, M., Pennycook, J., Hesse, E., & Buckling, A. (2020) Short-term relative invader growth rate predicts long-term equilibrium proportion in a stable, coexisting microbial community. *bioRxiv*.
8. van Houte, S., **Padfield, D.**, Gómez López, P., Lujan, A., Brockhurst, M., Paterson, S., & Buckling, A. (2019) Spatial heterogeneity of an ecologically relevant environment accelerates diversification and adaptation. *bioRxiv*. (co-first & co-corresponding author)
9. Hesse, E., **Padfield, D.**, Bayer, F., Van Veen, E.M., Bryan, C.G., & Buckling, A. (2019) Anthropogenic remediation of heavy metals selects against natural microbial remediation. *Proceedings of the Royal Society* 286(1905)
10. Castledine, M., Buckling, A., & **Padfield, D.** (2019) A shared coevolutionary history does not alter the outcome of coalescence in experimental populations of *Pseudomonas fluorescens*. *Journal of Evolutionary Biology* 32(1): 58-65
11. **Padfield, D.**, Buckling, A., Warfield, R., Lowe, C., & Yvon-Durocher, G. (2018) Linking phytoplankton community metabolism to the individual size distribution. *Ecology Letters* 21(8): 1152-1161
12. García-Carreras, B., Sal, S., **Padfield, D.**, Kontopoulou, D. G., Bestion, E., Schaum, C. E., Yvon-Durocher, G., & Pawar, S. (2018) Role of carbon allocation efficiency in the temperature dependence of autotroph growth rates. *Proceedings of the National Academy of Sciences* 115(31):E7361-E7368
13. Schaum, C. E., Student Research Team, Ffrench-Constant, R., Lowe, C., Ólafsson, J. S., **Padfield, D.**, & Yvon-Durocher, G. (2018) Temperature-driven selection on metabolic traits increases the strength of an algal-grazer interaction in naturally warmed streams. *Global change biology* 24(4): 1793-1803
14. **Padfield, D.**, Lowe, C., Buckling, A., Ffrench-Constant, R., Student Research Team, Jennings, S., & Yvon-Durocher, G. (2017) Metabolic compensation constrains the temperature dependence of gross primary production. *Ecology letters* 20(10): 1250-1260
15. **Padfield, D.**, Yvon-Durocher, G., Buckling, A., Jennings, S., & Yvon-Durocher, G. (2016) Rapid evolution of metabolic traits explains thermal adaptation in phytoplankton. *Ecology Letters* 19(2): 133-142

## Manuscripts Under Review

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1. Barneche, D., Hulatt, C., Dossena, M., **Padfield, D.**, Woodward, G., Trimmer, M., Yvon-Durocher, G. (2020) Warming decreases trophic transfer efficiency in a long-term field experiment. *in review at Nature*

2. **Padfield, D.**, O'Sullivan, H., & Pawar, S. (2020) *rTPC & nls.multstart* : a new pipeline to fit thermal performance curves at scale in R. *in review at Methods in Ecology and Evolution*
3. van Houte, S., **Padfield, D.**, Gómez López, P., Lujan, A., Brockhurst, M., Paterson, S., & Buckling, A. (2020) Spatial heterogeneity of an ecologically relevant environment accelerates diversification and adaptation. *in revision at Journal of Evolutionary Biology* (co-first & co-corresponding author)

## Software

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1. **Padfield, D.**, & Matheson, G. (2018). *nls.multstart*: An R package for robust non-linear regression using AIC Scores. R package version 1.2.0. <https://CRAN.R-project.org/package=nls.multstart>. Released onto CRAN and downloaded >11,000 times.
2. **Padfield, D.** (2020) *rTPC*: an R package for fitting thermal performance curves in R. <https://padpadpadpad.github.io/rTPC>

## Teaching Experience

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BIO244 Iceland field course in 2015 & 2016. Independently led a group of 10 students each year, investigating thermal adaptation in stream biofilms. The data from this project resulted in a publication in *Ecology Letters*.

Supervising and mentoring undergraduate and Masters students throughout PhD and post-doc. This resulted in an undergraduate-led publication (Castledine 2019).

Provided undergraduate statistics support (including reproducible code examples, see: <https://bit.ly/2lPRGYz>).

## Peer Review

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Reviewer for Ecology Letters, Ecology, Global Change Biology, Oikos, Freshwater Biology, Journal of Evolutionary Biology, Science of the Total Environment, Proceedings of the Royal Society B., Ecology & Evolution, The American Naturalist, Functional Ecology.

## Seminars and Conferences

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October 2019 **Talk**: University of Exeter Microbiology Symposium, Dartington Hall. The characterisation of a stable, coexisting model community.

February 2019 **Invited Symposium**: ASLO 2019. Adaptation of aquatic biodiversity to global change. *Invited but could not attend*

December 2018 **Talk**: British Ecology Society, BES Annual Meeting, Birmingham. Phage alter the thermal performance of their host.

August 2018 **Poster**: ISME17, Leipzig. Linking phytoplankton metabolism to the individual size distribution.

April 2018 **Invited Seminar**: Institute of Marine Ecosystem and Fishery Science, Hamburg University. Linking phytoplankton metabolism to the individual size distribution.

July 2016 **Poster**: GRC Unifying Ecology Across Scales, University of New England. Thermal adaptation constrains scaling of photosynthesis from populations to ecosystems.

December 2015 **Talk**: British Ecology Society, BES Annual Meeting, Edinburgh. Rapid evolution of metabolic traits explains thermal adaptation in phytoplankton.

July 2014 **Poster**: British Ecological Society, BES Aquatic Ecology Annual meeting, London. Poster: Thermal acclimation of the aquatic algae *Chlorella vulgaris* - testing predictions from the metabolic theory of ecology.

**References available upon request**