

Tom Smith

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RESEARCH INTERESTS

Broadly I am interested in ecology and evolution at large scales - understanding how current patterns of biodiversity are reflective of environmental conditions as well as historical patterns of evolution. Combining laboratory experiments with bioinformatics tools and mathematical modeling, I work to understand ecological responses to changing environments - from the organism through to the community level. I am particularly interested in how the structure and function of microbial communities is related to ecosystem functioning.

RESEARCH EXPERIENCE

- 2021 - present Postdoctoral Research Associate
Tom Bell's group, Imperial College London
Impacts of multiple chemical stressors on freshwater microbes
- 2020 - 2021: Postdoctoral Research Associate
Will Pearse's group, Imperial College London
Impacts of the environment on SARS-CoV-2 transmission rates
- 2020: Postdoctoral Research Associate
Emma Ransome's group, Imperial College London
The potential of seagrasses for blue carbon storage
- 2018: Professional Internship Placement, NatureMetrics
Developing new assays for eDNA surveys of protected animals
- 2012 - 2014: Research Technician in Molecular Phylogenetics
Vincent Savolainen's Group, Imperial College London
Sequencing plant and animal tissues for molecular phylogenetics
- 2010 - 2012: Research Technician, Ontogeny of Haematopoietic Stem Cells
Alexander Medvinsky's Group, University of Edinburgh
Characterization of transgenic mouse lines via PCR and Southern Blot

EDUCATION

- 2015 - 2019: PhD in Life Sciences, Imperial College London
Effects of Temperature on Microbial Metabolic Rates
Supervisors: **Dr. Samraat Pawar** and **Prof. Tom Bell**
- 2014 - 2015: MRes Computational Methods in Ecology and Evolution, Imperial College London
Research project: *Horizontal Gene Transfer in Bdelloid Rotifers*
Project Supervisor: **Prof. Tim Barraclough**
- 2006 - 2010: BSc (Honours) Biological Sciences (Biotechnology), University of Edinburgh
Honours project: *Investigation of insulin aggregation using mass spectrometry*

RESEARCH SKILLS

Molecular biology and microbiology

Bacterial culture and isolation, flow cytometry, DNA extraction, PCR, Sanger sequencing, Illumina library prep.

Coding

R (extensive experience), L^AT_EX (extensive experience), Git (good experience), Python 2/3 (working knowledge), Bash (working knowledge).

Bioinformatics

Genome assembly, recombination analysis, sequence alignment, BLAST tools, PCR primer design.

Phylogenetics

RAxML, BEAST, MrBayes, R{ape}, R{phytools}, PAML.

Computational ecology

Fitting mathematical models to biological and ecological data in R and Python, e.g. bacterial growth curves, thermal response curves.

Statistical modelling

Hierarchical Bayesian modelling, Bayesian statistics, epidemiological modelling.

PUBLICATIONS

h-index: 8 i10-index: 8 total citations: >250 [Google Scholar profile: goo.gl/Ps8LgK](https://scholar.google.com/citations?user=Ps8LgK)

Peer reviewed

- 2021: Pablo Lechon, Tom Clegg, Jacob Cook, **Thomas P Smith**, Samraat Pawar - The role of competition versus cooperation in microbial community coalescence. *PLOS Computational Biology* 17(11) e1009584 doi: [10.1371/journal.pcbi.1009584](https://doi.org/10.1371/journal.pcbi.1009584)
- 2021: **Thomas P Smith**, Tom Clegg, Thomas Bell, Samraat Pawar - Systematic variation in the temperature dependence of bacterial carbon use efficiency. *Ecology Letters* doi: [10.1111/ele.13840](https://doi.org/10.1111/ele.13840)
- 2021: **Thomas P Smith**, Seth Flaxman, Amanda S. Gallinat, Sylvia P. Kinoshian, Michael Stemkovski, H. Juliette T. Unwin, Oliver J. Watson, Charles Whittaker, Lorenzo Cattarino, Ilaria Dorigatti, Michael Tristem, William D. Pearse - Temperature and population density influence SARS-CoV-2 transmission in the absence of non-pharmaceutical interventions. *PNAS* 118(25):e2019284118 doi: [10.1073/pnas.2019284118](https://doi.org/10.1073/pnas.2019284118)
- 2020: Dimitrios-Georgios Kontopoulos, **Thomas P Smith**, Timothy G Barraclough, Samraat Pawar - Adaptive evolution shapes the present-day distribution of the thermal sensitivity of population growth rate. *PLOS Biology* 18(10):e3000894 doi: [10.1371/journal.pbio.3000894](https://doi.org/10.1371/journal.pbio.3000894)
- 2019: **Thomas P Smith**, Thomas JH Thomas, Bernardo García-Carreras, Sofía Sal, Gabriel Yvon-Durocher, Thomas Bell, Samraat Pawar - Community-level respiration of prokaryotic microbes may rise with global warming. *Nature Communications* 10:5124 doi: [10.1038/s41467-019-13109-1](https://doi.org/10.1038/s41467-019-13109-1)
- 2019: Alexander ST Papadopoulos, Javier Igea, **Thomas P Smith**, Ian Hutton, William J Baker, Roger K Butlin, Vincent Savolainen - Ecological speciation in sympatric palms: 4. Demographic analyses support speciation of *Howea* in the face of high gene flow. *Evolution* 73(9):1996-2002 doi: [10.1111/evo.13813](https://doi.org/10.1111/evo.13813)

- 2018: Reuben W Nowell, Pedro Almeida, Christopher G Wilson, **Thomas P Smith**, Diego Fontaneto, Alastair Crisp, Gos Micklem, Alan Tunnacliffe, Chiara Boschetti, Timothy G Barraclough - Comparative genomics of bdelloid rotifers: Insights from desiccating and nondesiccating species. *PLoS Biology* 16(4), e2004830
doi: [10.1371/journal.pbio.2004830](https://doi.org/10.1371/journal.pbio.2004830)
- 2018: Dimitrios-Georgios Kontopoulos, Bernardo García-Carreras, Sofía Sal, **Thomas P Smith**, Samraat Pawar - Use and misuse of temperature normalisation in meta-analyses of thermal responses of biological traits. *PeerJ* 6:e4363
doi: [10.7717/peerj.4363](https://doi.org/10.7717/peerj.4363)
- 2015: Isobel Eyres, Chiara Boschetti, Alastair Crisp, **Thomas P Smith**, Diego Fontaneto, Alan Tunnacliffe, Timothy G Barraclough - Horizontal gene transfer in bdelloid rotifers is ancient, ongoing and more frequent in species from desiccating habitats. *BMC Biology* 13:90
doi: [10.1186/s12915-015-0202-9](https://doi.org/10.1186/s12915-015-0202-9)
- 2015: Harriet Cole, Massimiliano Porrini, Ryan Morris, **Tom Smith**, Jason Kalapothakis, Stefan Weidt, C. Logan Mackay, Cait E. MacPhee, Perdita E. Barran - Early stages of insulin fibrillogenesis examined with ion mobility mass spectrometry and molecular modelling *Analyst* 140:7000-7011 doi: [10.1039/C5AN01253H](https://doi.org/10.1039/C5AN01253H)
- 2014: Anna Liakhovitskaia, Stanislav Rybtsov, **Tom Smith**, Antoniana Batsivari, Natalia Rybtsova, Christina Rode, Marella De Bruijn, Frank Buchholz, Sabrina Gordon-Keylock, Suling Zhao, Alexander Medvinsky - Runx1 is required for progression of CD41+ embryonic precursors into HSCs but not prior to this. *Development* 141(17):3319-23
doi: [10.1242/dev.110841](https://doi.org/10.1242/dev.110841)

Pre-prints

- 2021: **Thomas P Smith**, Michael Stemkovski, Austin Koontz, William D Pearse - AREAdata: a worldwide climate dataset averaged across spatial units at different scales through time *bioRxiv* 2021.10.05.463057 doi: [10.1101/2021.10.05.463057](https://doi.org/10.1101/2021.10.05.463057)
- 2021: **Thomas P Smith**, Shorok Mombrikotb, Emma Ransome, Dimitrios-Georgios Kontopoulos, Samraat Pawar, Thomas Bell - Latent functional diversity may accelerate microbial community responses to environmental fluctuations. *bioRxiv* 2021.04.14.439774
doi: [10.1101/2021.04.14.439774](https://doi.org/10.1101/2021.04.14.439774)
- 2021: **Thomas P Smith**, Ilaria Dorigatti, Swapnil Mishra, Erik Volz, Patrick GT Walker, Manon Ragonnet-Cronin, Michael Tristem, William D Pearse - Environmental drivers of SARS-CoV-2 lineage B.1.1.7 transmission intensity *medRxiv* 2021.03.09.21253242
doi: [10.1101/2021.03.09.21253242](https://doi.org/10.1101/2021.03.09.21253242)

PRESENTATIONS

Invited seminars

- 2020: *Ecology & Evolution Seminar Series* - Imperial College London, UK
Talk: Effects of Temperature on Microbial Metabolic Rates: Linking Individual Responses to Ecosystem Impacts.
- 2019: [Internal] *Silwood Park Social Seminars* - Imperial College London, UK
Talk: Effects of Temperature on Microbial Biological Rates.

International Conferences

- 2021: *BES Ecology Across Borders meeting 2021* - Liverpool, UK
Talk: Environmental drivers of SARS-CoV-2 transmission: insights from an ecologist working with epidemiologists.
- 2018: *ISME 17th International Symposium on Microbial Ecology* - Leipzig, Germany
Poster: Selective Isolation of Soil Bacteria with Differing Thermal Niches
- 2017: *BES Ecology Across Borders meeting 2017* - Ghent, Belgium
Poster: Metabolic Rates of Prokaryotes May Inevitably Rise With Global Warming

PROFESSIONAL SERVICE

Reviewing: *Functional Ecology*.

Academic memberships:

2020-present: British Ecological Society (BES)

Departmental services:

2021-present: Organising Silwood Park Ecology & Evolution Seminar Series
2017-18: Chairing for Frontiers in Ecology, Evolution and Conservation Symposium
- Metabolic Ecology sessions

TEACHING

Teaching Assistance

- 2015-18: MSc students: Biological Computing in R
Demonstrator, Imperial College London
- 2012-13: MSc students: Molecular Ecology
Teaching assistant, Imperial College London
- 2012-13: MSc students: Molecular Genetics and Genomics
Teaching assistant, Imperial College London

Student project mentoring

- 2020: Pablo Lechón (Imperial College London - MSc Project) *Coalescence of cohesive microbial communities*
- 2020: Miles Nesbit (Imperial College London - MRes Project) *Deviation of growth rate and carrying capacity constraints from the metabolic theory of ecology in prokaryotes*
- 2018: Hira Tanvir (Imperial College London - MSc Project) *Cell volume affects growth rates in microbes across all of life*
- 2016: Thomas J. Thomas (Imperial College London - BSc Project) *Is Hotter Better? A Meta-analysis of Prokaryotic Growth Rates.*

PUBLIC ENGAGEMENT AND OUTREACH

Outreach Events

- 2021: Science Museum: Future Explorers – *exhibitor*
- 2019 & 2016: Imperial Festival – *exhibitor*
- 2016 & 2015 & 2014: Silwood “Bugs!” day – *exhibitor*