Tom Smith

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RESEARCH INTERESTS

I am a microbial ecologist, broadly interested in 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 microbial responses to changing environments - from the organism through to the community level. I am particularly interested in how changes in the structure and function of microbial communities affects ecosystem functioning.

RESEARCH EXPERIENCE

2023 - present	Postdoctoral Research Associate **Tom Bell**'s group, Imperial College London *Evolutionary dynamics in wild bacterial communities*
2021 - 2023	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, Nanopore library prep.

Coding
R (extensive experience), LaTeX (extensive experience), Git (good experience), Python 2/3 (working knowledge), Bash (working knowledge).

Bioinformatics
16S amplicon sequencing analyses (e.g. QIIME), genome and metagenome assembly, functional annotation, 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: 11 i10-index: 11 total citations: >450 Google Scholar profile: goo.gl/Ps8LgK

Peer reviewed

2022: **Thomas P Smith**, Shorok Mombrikotb, Emma Ransome, Dimitrios-Georgios Kontopoulos, Samraat Pawar, Thomas Bell - Latent functional diversity may accelerate microbial community responses to temperature fluctuations. *eLife* 11 e80867 doi: 10.7554/eLife.80867

2022: **Thomas P Smith**, Michael Stemkovski, Austin Koontz, William D Pearse - AREAdata: a worldwide climate dataset averaged across spatial units at different scales through time *Data in Brief* 43 108438 doi: 10.1016/j.dib.2022.108438

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

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

2021: **Thomas P Smith**, Seth Flaxman, Amanda S. Gallinat, Sylvia P. Kinosian, 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

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

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

2019: Alexander ST Papadopulos, 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

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

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

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

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

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

Pre-prints

2023: **Thomas P Smith**, Tom Clegg, Emma Ransome, Thomas Martin-Lilley, James Rosindell, Guy Woodward, Samraat Pawar, Thomas Bell - Bacterial responses to complex mixtures of chemical pollutants *bioRxiv* 2023.02.18.529059
doi: 10.1101/2023.02.18.529059

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

AWARDS AND GRANTS

2020: £287,120 - UKRI-NERC NE/V009710/1 "COVID 19 - Improving COVID-19 forecasts by accounting for seasonality and environmental responses" (named postdoc, awarded to WP).

PRESENTATIONS

Conferences

2022: *Molecular Microbial Ecology Group meeting 2022* - Glasgow, UK
Talk: Bacterial Responses to Chemical Stressors.
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

Internal seminars

2022: *Silwood 75th Anniversary Young Researcher Talks* - Imperial College London, UK
Talk: COVID-19 Seasonality - Ecology meets Epidemiology at Silwood Park
2020: *Ecology & Evolution Seminar Series* - Imperial College London, UK
Talk: Effects of Temperature on Microbial Metabolic Rates: Linking Individual Responses to Ecosystem Impacts.
2019: *Silwood Park Social Seminars* - Imperial College London, UK
Talk: Effects of Temperature on Microbial Biological Rates.

PROFESSIONAL SERVICE

Reviewing: *Ecology Letters*; *Evolution Letters*; *Trends in Ecology and Evolution*; *Functional Ecology*; *Microbial Risk Analysis*.

Academic memberships:

2022-present: Microbiology Society
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

2021: MSc students: Environmental Microbiology
Teaching assistant, Imperial College London
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

2022: Yuruo Lin (Imperial College London - BSc Project) *Effects of multiple chemical stressors on freshwater bacteria*
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

2022 & 2016 & 2015 & 2014: Silwood "Bugs, Birds and Beasts" day – *exhibitor*
2021: Science Museum: Future Explorers – *exhibitor*
2019 & 2016: Great Exhibition Road Festival – *exhibitor*