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

2020 - present — 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), LaTeX (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: 7 i10-index: 5 total citations: >200 Google Scholar profile: goo.gl/Ps8LgK

Peer reviewed

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

2021: Pablo Lechon, Tom Clegg, Jacob Cook, **Thomas P Smith**, Samraat Pawar - The role of competition versus cooperation in microbial community coalescence. *bioRxiv* 2021.04.18.440290 doi: 10.1101/2021.04.18.440290

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

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

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

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:
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
2016 & 2015 & 2014: Silwood "Bugs!" day – *exhibitor*
2019 & 2016: Imperial Festival – *exhibitor*