# 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

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|---|---|
| 2021 - present | Postdoctoral Research Associate<br>**Tom Bell**'s group, Imperial College London<br>*Impacts of multiple chemical stressors on freshwater microbes* |
| 2020 - 2021: | Postdoctoral Research Associate<br>**Will Pearse**'s group, Imperial College London<br>*Impacts of the environment on SARS-CoV-2 transmission rates* |
| 2020: | Postdoctoral Research Associate<br>**Emma Ransome**'s group, Imperial College London<br>*The potential of seagrasses for blue carbon storage* |
| 2018: | Professional Internship Placement, NatureMetrics<br>*Developing new assays for eDNA surveys of protected animals* |
| 2012 - 2014: | Research Technician in Molecular Phylogenetics<br>**Vincent Savolainen**'s Group, Imperial College London<br>*Sequencing plant and animal tissues for molecular phylogenetics* |
| 2010 - 2012: | Research Technician, Ontogeny of Haematopoietic Stem Cells<br>**Alexander Medvinsky**'s Group, University of Edinburgh<br>*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: 8 i10-index: 8 total citations: >250 Google Scholar profile: goo.gl/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

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: **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

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**

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**

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