Biosketch

Assist.-Prof. Shaul Pollak Pasternak, PhD

Position in CoE: Key Researcher

Personal Details

Place of birth	Tel-Aviv, Israel
Nationality	Israeli
Children	-
Affiliation:	University of Vienna
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Profile	-
List of publications	ORCID: 0000-0002-8976-5944
Academic age	6 years since PhD

Academic Career and Positions Held

I got my **Bachelor's degree** at **Tel-Aviv University** studying general biology. My **Master and PhD research** in evolutionary systems biology was conducted in Prof. Avigdor Eldar's lab at **Tel-Aviv University**. We studied the evolution of bacterial communication systems known as "Quorum-Sensing" systems using mathematical models and the power of bacterial genetics. In 2018, for my first postdoc, I travelled across the ocean to **Massachusetts Institute of Technology** to work with Prof. Otto Cordero on machine-learning to infer the ecological role of microbes. My second postdoc with Prof. Penny (Sallie) Chisholm, also at MIT, revolved around the evolutionary diversification of the most abundant phototroph on earth – Prochlorococcus marinus. In 2023, I accepted an offer from the **University of Vienna** as a **group leader** and became a **tenure-track professor** in 2024.

Scientific Achievements and Scientific Contribution to the CoE

Scientific Achievements. I have been developing and implementing computational approaches to achieve the vision of **"reverse ecology" in microbes** – inferring ecologically relevant information from genomic data. My two postdocs were conducted in a framework of large multi-university collaborations funded by the Simons Foundation aiming to uncover basic principles in microbial ecology. During my graduate studies, across **multiple ERC funded projects**, I connected evolutionary theory to observed diversity patterns, developed models and ran experiments that set lower bounds to the ability of cells to sense their own secreted signals, and contributed to the understanding of how the lab strain of Bacillus subtilis differs from "wild" isolates.

Scientific Contribution to the CoE. Our lab will contribute to the CoE by participating in the **synthesis module**. We will use the unique opportunity to analyze high-quality and uniform data across biomes to develop and test simple theories that aim to uncover the **basic principles and constraints that drive community diversity, evolution, and function**. We will use tools from **complex systems**, **evolutionary theory**, **physiological and metabolic theory**, and **ecological stoichiometry** to explore our ideas. Additionally, we will be contributing our expertise in **metagenomic analysis** and the influence of ecological interactions across the work packages.

10 Most Important Publications (*relevant for the CoE)

1. *Gralka, M; **Pollak, S**; Cordero, OX. Genome content predicts the carbon catabolic preferences of heterotrophic bacteria. *Nat Microbiol.* **2023**, 8(10):1799-1808. *https://doi.org/10.1038/s41564-023-01458-z.*
2. *Pontrelli, S; Szabo, R; **Pollak, S;** Schwartzman, J; Ledezma-Tejeida, D; Cordero, OX; Sauer, U. Metabolic cross-feeding structures the assembly of polysaccharide degrading communities. *Sci Adv*. **2022**, 8(8):eabk3076. *https://doi.org/10.1126/sciadv.abk3076*.
3. Szabo, RE; Pontrelli, S; Grilli, J; Schwartzman, JA; **Pollak, S**; Sauer, U; Cordero, OX. Historical contingencies and phage induction diversify bacterioplankton communities at the microscale. *Proc Natl Acad Sci U S A*. **2022**,119(30):e2117748119. *https://doi.org/10.1073/pnas.2117748119.*
4. ***Pollak, S**; Gralka ,M; Sato, Y; Schwartzman, J; Lu, L; Cordero, OX. Public good exploitation in natural bacterioplankton communities, *Science Advances* **2021**, 7(31), p. eabi4717. *https://doi.org/10.1126/sciadv.abi4717.*
5. Bareia, T; **Pollak, S**; Eldar, A. Self-sensing in Bacillus subtilis quorum-sensing systems. *Nat Microbiol*. **2018**, 3(1):83-89. *https://doi.org/10.1038/s41564-017-0044-z*.
6. Even-Tov, E; Omer Bendori, S; **Pollak, S**; Eldar, A. Transient Duplication-Dependent Divergence and Horizontal Transfer Underlie the Evolutionary Dynamics of Bacterial Cell-Cell Signaling. *PLoS Biol*. **2016**, 14(12):e2000330. *https://doi.org/10.1371/journal.pbio.2000330*.
7. Even-Tov, E; Bendori, SO; Valastyan, J; Ke, X; **Pollak, S**; Bareia, T; Ben-Zion, I; Bassler, BL; Eldar, A. Social Evolution Selects for Redundancy in Bacterial Quorum Sensing. *PLoS Biol*. **2016**, 14(2):e1002386. *https://doi.org/10.1371/journal.pbio.1002386*.
8. ***Pollak, S**; Omer-Bendori, S; Even-Tov, E; Lipsman, V; Bareia, T; Ben-Zion, I; Eldar, A. Facultative cheating supports the coexistence of diverse quorum-sensing alleles. *Proc Natl Acad Sci U S A*. **2016**, 113(8):2152-7. *https://doi.org/10.1073/pnas.1520615113.*
9. Omer Bendori, S; **Pollak, S**; Hizi, D; Eldar, A. The RapP-PhrP quorum-sensing system of Bacillus subtilis strain NCIB3610 affects biofilm formation through multiple targets, due to an atypical signal-insensitive allele of RapP. *J Bacteriol.* **2015,** 197(3):592-602. *https://doi.org/10.1128/jb.02382-14*.
10. **Pollak, S**; Omer Bendori, S; Eldar, A. A complex path for domestication of B. subtilis sociality. *Curr Genet.* **2015,** 61(4):493-6, *https://doi.org/10.1007/s00294-015-0479-9.*