

MSc thesis project on bacterial predator-prey dynamics and regulation

The project will center on the rising opportunistic human pathogen bacteria *Stenotrophomonas maltophilia*. *S. maltophilia* is considered to be a low-virulence bacterium, but due to its intrinsic antibiotic resistance, it's increasingly hard to treat in nosocomial infections. In addition, *S. maltophilia* has been shown to kill competing bacteria *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and *Salmonella* in a contact-dependent manner via its Type 4 secretion system (T4SS). Like a molecular syringe, the T4SS is used to establish direct contact between *S. maltophilia* and its competing bacteria and to shuttle so-called effector proteins from its cytosol into its opponent. Once translocated, the effectors lead to the cell death of the competing bacterium (<https://doi.org/10.1371/journal.ppat.1007651>; <https://doi.org/10.3389/fmicb.2019.01078>)

During the Master's thesis, the detailed regulatory response of *S. maltophilia* and its T4SS towards different environmental cues and bacterial species will be investigated via fluorescent reporter constructs. To do so, molecular microbiology methods will be combined with fluorescence microscopy, motility assays, and quantitative image analysis.

Prior knowledge in molecular biology, biophysics, or microscopy are welcome but not needed. The earliest starting point possible will be 01.10.2026 but will be determined based on mutual agreement.

**For further information and applications,
please contact Dr. Stephan Wimmi (swimmi@uni-koeln.de).**