

Master's research project
**Molecular mechanisms that allow bacteria
to “innovate” antibiotic molecules**



Fields: Molecular biology, synthetic biology, bacterial genetics.

Approach: Experimental.

Techniques: Molecular cloning, gene editing, genetic assays.

Duration: Flexible, 3-9 months full or part-time.

Topic: Many antibiotics are natural products, meaning that these molecules are not synthesized in the lab but instead are extracted from microorganisms that produce them in their natural environments. Our aim is to understand how the vast **diversity of natural products** came to be, to decipher the molecular, biochemical and **evolutionary mechanisms** that allow the **biosynthetic genes** to mutate and produce **novel antibiotics**, and to harness our findings for **bioengineering**.

Overview: At the core of our research is the study of a new type of genetic element called GRINS. With this project, we aim to measure the frequency at which this genetic element propagates in model bacteria *E.coli* and compare it to the high frequency observed in the soil bacteria *Streptomyces*, which are responsible for the biosynthesis of many antibiotics. This will provide insights into the evolutionary mechanisms that drive the diversification of novel antibiotic molecules.

Prerequisites: Motivation to learn microbiology and molecular biology methods (DNA extraction; PCR; cloning). Experience is desired but not required.

Environment: We are an international group committed to providing an interdisciplinary, collaborative, and inclusive research environment.

Interested? Please email me: aleksandra.nivina@uzh.ch

Evolution of Natural Product Biosynthesis Group (Dr. Aleks Nivina)
University of Zurich, Dept. of Evolutionary Biology and Environmental Studies