UNI BASEL

BIOZENTRUM
Universität Basel
The Center for
Molecular Life Sciences

**PhD position on the role of noise in the evolution of single-cell gene regulation**
**University of Basel, Switzerland**

The group of Prof. Erik van Nimwegen at the Biozentrum, University of Basel, is seeking a PhD student that is highly motivated to apply quantitative experimental approaches to study the role of noise in the evolution of single-cell gene regulation in bacteria.

The van Nimwegen group is a highly interdisciplinary group of researchers with backgrounds ranging from theoretical physics to molecular biology that study the structure, function, and evolution of gene regulatory networks that control gene expression. We are part of the focal area Computational and Systems Biology of the Biozentrum and also a research group of the Swiss Institute of Bioinformatics. Our group includes both an experimental section where researchers with backgrounds in molecular biology and biophysics are experimentally studying genome evolution and gene regulation at the single cell level in bacteria, and a theoretical section where researchers with backgrounds in theoretical physics, computer science, and applied mathematics are using techniques from Bayesian probability, evolutionary theory, dynamical systems theory, and stochastic processes, to study the function and evolution of genome-wide regulatory networks in cells. We are particularly interested in uncovering the principles by which gene regulation evolves, how cells control and exploit the noise in gene regulatory processes, and how genome-wide regulatory networks specify and maintain cell identity in multi-cellular organisms. The dual organization of the lab and strong interactions between the two sections offers PhD students the unusual chance to get exposed to a particularly wide range of scientific ideas and approaches.
The current project will focus on the role of noise in the evolution of gene regulation, following up on previous work from our group (Wolf et al. Elife 2015). In particular, the PhD student will study how gene regulation at the single cell level has evolved across a set of wild *E. coli* isolates using a range of experimental techniques such as flow cytometry, time-lapse microscopy in combination with microfluidics (i.e. see our recent work on an integrated system for studying gene regulation in single-cells Kaiser et al, Nat Comm 2018 and associated video), and also molecular biology techniques for genetic engineering (cloning, targeted mutagenesis). Our approach differs from most molecular biology labs in that it is highly quantitative and that research questions are typically motivated by theoretical questions. The project will involve considerable computational analysis and modeling to be performed by the student, possibly in collaboration with a theoretical student in the group.

The candidate should have a solid background in microbiology and molecular biology and should have a strong interest in applying computational and theoretical approaches. Although not a necessary requirement, preference will be given to candidates that already have strong computational and analytical skills. A good knowledge of English is required. German is helpful but not necessary. The salary is generous and is set according to the guidelines of the Swiss National Science Foundation. The start date will by mutual arrangement, with a preference for students that can start soon.

Basel is a very international city and a center of life science research, with over 900 life science research companies in the area, including Novartis and Roche. Several other academic institutions are also in the city, including the Friedrich Miescher Institute, the ETH Zurich Biosystems Science and Engineering Department, and the Swiss Tropical Institute. The city is less than 5km from both France and Germany and an hour and a half from the Swiss Alps.

To apply, please send a single pdf containing your application letter, CV, and the names of at least two references to

erik.vannimwegen@unibas.ch

Review of applications will begin immediately.