

**Research/Thesis Project:**

**Investigating YidC mediated folding pathways of  $\alpha$ -helical membrane proteins**

**Location:** Biophysics Group (Prof. D.J. Müller), ETH Zurich, D-BSSE, **Basel**, Switzerland

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**Application:** Motivation letter, CV, university transcripts

This interdisciplinary topic offers fascinating possibilities for different research/thesis projects focusing on membrane protein biochemistry and biophysics.

**Project Description:**

The insertion and folding of transmembrane proteins (TMPs) into cellular membranes is crucial in protein biogenesis. Because TMPs are virtually involved in every basic process of life, their improper folding can lead to debilitating diseases. This folding of TMPs is assisted by an universally conserved folding machinery, including insertases. The bacterial insertase YidC has been recently shown to initiate folding of lactose permease LacY by inserting a single structural segment into the membrane. After this first folding step, the LacY polypeptide folds along variable pathways until reaching its native structure [1]. However, how YidC guides other TMPs along their folding pathways and to which extent the polypeptide of a TMP funnels itself along this pathway remains elusive. To understand the folding process of individual TMP polypeptides we apply high-resolution atomic force spectroscopy (AFM) imaging and single-molecule force spectroscopy (SMFS).

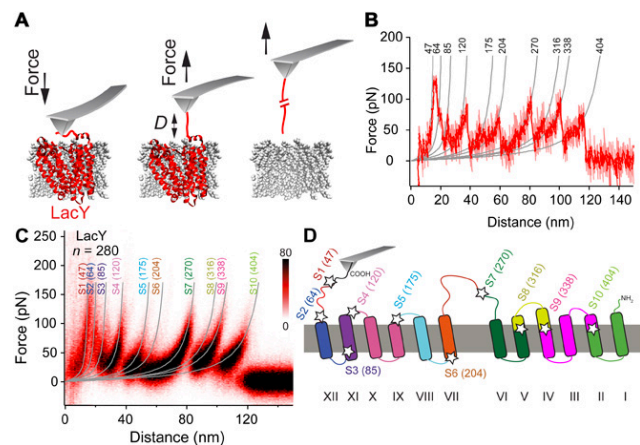


Figure 1 Unfolding fingerprint of native LacY.

**We are looking for** highly motivated students with a background in biochemistry, molecular biology or biophysics (optional) to support our efforts in understanding how insertases facilitate the insertion and folding of TMPs. The students are coached by junior and senior members of our research team and should feel comfortable in working independently and ambitiously to tackle scientific problems with out-of-the-box thinking.

**We offer** excellent state-of-the-art technology in an inspiring multidisciplinary field at a high ranked university. You will have a skilled supervisor appointed to you, work in an interdisciplinary research team and participate in weekly meetings where we discuss the most recent scientific advances. Further, the ETH Department of Biosystems Science and Engineering in Basel provides the perfect international setting, scientifically as well as culturally. You will also get the chance to meet other department members during social events regularly organized in the department.

\*Incoming students to Switzerland should consult their home university for “study abroad” funding.

[1] Serdiuk, Tetiana et al. Insertion and folding pathways of single membrane proteins guided by translocases and insertases. *Science Advances* (2019) 5, eaau6824. doi:10.1126/sciadv.aau6824