



© privat

André Schneider, Dr. phil. nat.

Professor of Biochemistry

Universität Bern

Born in 1960 in Solothurn, Switzerland
Studied Biology at the University of Bern

ARBEITSVORHABEN

Origin of Protein Translocases in Organellar Membranes

All organisms consist of either simple or complex cells. Simple cells lack internal structures, whereas complex cells contain a set of membrane-bound compartments, termed organelles, that have dedicated functions that are essential for survival. All macroscopic life, including humans, consists of complex cells that in many ways are superior to simple cells. However, proteins, the building blocks of cells, are produced outside organelles. Complex cells therefore face a huge logistic challenge: they need to transport proteins to the correct organelles and translocate them across the barrier of the organellar membranes. This process needs to be efficient and specific, since each organelle has a unique protein composition. Transport of proteins from the cis to the trans side of the corresponding organellar membranes depends on membrane-embedded molecular machines, termed protein translocases. While the function of the various protein translocases is well studied, their evolutionary history is still enigmatic. Understanding the origin of organellar protein translocases, however, is of the utmost importance, as it may provide insights into the evolution of the organelles themselves and thus into one of the most important transitions in the history of life, the origin of complex cells. For my Wissenschaftskolleg project, I plan to initiate a comparative analysis of protein translocases based on the scientific literature. More precisely, I would like to find out which parts of organellar protein translocases derive from which counterparts in simpler cells and which ones are novel inventions of complex cells. Subsequently, I would like to trace back the evolutionary history of the translocases and reveal their immutable features that are imposed by their shared function.

Recommended Reading

Mani, Jan, Silvia Desy, Moritz Niemann, Astrid Chanfon, Silke Oeljeklaus, Mascha Pusnik, Oliver Schmidt, et al. (2015). "Mitochondrial Protein Import Receptors in Kinetoplastids Reveal Convergent Evolution over Large Phylogenetic Distances." *Nature Communications* 6: 6646. <https://doi.org/10.1038/ncomms7646>.

Harsman, Anke, Silke Oeljeklaus, Christoph Wenger, Jonathan L. Huot, Bettina Warscheid, and André Schneider (2016). "The Non-Canonical Mitochondrial Inner Membrane Presequence Translocase of Trypanosomatids Contains Two Essential Rhomboid-Like Proteins." *Nature Communications* 7: 13707. <https://doi.org/10.1038/ncomms13707>.

Schneider, André (2020). "Evolution of Mitochondrial Protein Import – Lessons from Trypanosomes." *Biological Chemistry* 401, no. 6–7: 663–676. <https://doi.org/10.1515/hsz-2019-0444>.

Schneider, André (Heidelberg,2019)

Eine Translokase für Makromoleküle in Mitochondrien von Trypanosomen

<https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1814318577>

Schneider, André (Oxford,2017)

Mitochondrial protein import in trypanosomes : expect the unexpected

<https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1814318046>

Schneider, André ([London],2016)

The non-canonical mitochondrial inner membrane presequence translocase of trypanosomatids contains two essential rhomboid-like proteins

<https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1814319255>

Schneider, André (Neuchâtel,1997)

Nomen latinum

<https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1131582144>

Nomen latinum

<https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1131582144>