KOLLOQUIUM

Institut für Molekulare Biowissenschaften
Summersemester 2024

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Science in progress

Tuesday, July 9th, 2024, 12:00, Biocentre, lecture hall B3

Jennifer Roth and Max Angstenberger

Jennifer Roth

Structure and function of the Rnf complex, an ancient respiratory enzyme

Chemiosmotic energy conservation has already invented by the earliest life forms that made a living in the absence of oxygen. Iron and sulfur was abundant on early Earth and served as electron carriers. Here, we describe the structure and function of one of the oldest respiratory enzymes on Earth, the Rnf complex. The enzyme accepts electrons from Fe/S center in the electron carrier ferredoxin ($E_0' \approx$ - 450 mV) and transfers the electrons to NAD^+ ($E_0' =$ - 320 mV). This reaction is coupled to Na^+/H^+ transport across the membrane. The ion-translocating enzyme operates at one of the lowest redox spans known ($\Delta E_0' \approx$ - 130 mV). NADH is the waste product of respiration and re-oxidized for example by reduction of CO_2 in the Wood-Ljungdahl pathway of CO_2 fixation, the only pathway of CO_2 fixation that is coupled to net ATP synthesis and thus allows growth on primordial Earth. Here, I will describe the structure, function and mechanism of Na^+ transport by the Rnf complex from *Acetobacterium woodii*, as revealed by cryo-EM, site-directed mutagenesis and MD simulation.

More Information: https://tinygu.de/kolloqmbw

Max Angstenberger

Genome Editing in *Chlamydomonas reinhardtii*

Being fundamental to investigate the molecular function as well as the physiological mechanisms of specific proteins, manipulation of the nuclear genome of unicellular microalgae such as *Chlamydomonas reinhardtii* via Genome Editing has become indispensable. However, precise and efficient Genome Editing approaches need to overcome several technical and importantly biological obstacles in order to avoid endless screening of mutants, and to develop reliable techniques to become routine approaches. In order to do so, exploiting CRISPR/Cas9 based approaches in combination with Homologous Recombination (HR) for nuclear manipulation and the coupling to photosynthetic phenotypes enabled the establishment of precise and efficient strategies. Moreover, new insights into mechanisms of photosynthesis in *Chlamydomonas reinhardtii* could be obtained, extending our knowledge of light-to-energy conversion as well as photoprotective mechanisms and is further enabling the investigation of highly efficient microalgal strains as potential platforms for biotechnological applications.

Science in progress represents talks of institute members. Either post docs or advanced PhD students present and discuss their recent data.

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