FASSBERG SEMINAR SERIES

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Special Date

Mammalian mitochondrial translation – key mechanisms revealed by cryo-EM

Mitochondria are eukaryotic organelles that critically influence the process of aging and defects in mitochondrial protein homeostasis are involved in a number of severe human pathologies such as cancer and cardiomyopathies. Mitochondria originate from alpha-proteobacterial ancestors and have undergone a rapid evolution in their eukaryotic environment. This has also affected the mitochondrial translation apparatus, which has become very specialized producing only a few polypeptide chains. Despite their small number these proteins are essential since they are parts of the respiratory chain complexes rationalizing why defects in mitochondrial translation are detrimental to human health.

The mitochondrial ribosome and its surrounding regulatory elements have undergone a striking re-composition in comparison to bacteria, including alterations in mitochondrial messenger RNAs, adaptions of the genetic code and the lack of translation factors that are otherwise essential. This resulted in highly distinct and specialized mechanisms of translation. In order to gain mechanistic insights into the mitochondrial translation cycle, our lab has set out to reconstitute multiple key translation intermediates and determine their high-resolution structures by cryo-electron microscopy. Our structural observations are complemented with biochemical assays and define how peculiar adaptions in central translation factors promote faithful initiation as well as termination of translation in mammalian mitochondria.

Host: Dirk Görlich

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