Speaker name: Sine L. Svenningsen; University of Copenhagen

Title: “Rapid and extensive tRNA degradation is an integral part of the bacterial stress response”

Short abstract:
Due to its long half-life compared to messenger RNA, bacterial transfer RNA (tRNA) and ribosomal RNA (rRNA) have become known as stable RNAs. We have recently shown that tRNAs become highly unstable as part of Escherichia coli’s response to amino acid starvation and other stresses that halt translation (Svenningsen et al., Nucl Acids Res, 2017). Degradation of the majority of cellular tRNA occurs within ten minutes of the onset of starvation for each of several amino acids. Both the non-cognate and cognate tRNA for the amino acid that the cell is starving for are degraded, and both charged and uncharged tRNA species are affected. In this talk, I will further show that the degradation of stable RNA also includes rRNA, and the total RNA content of starved cells is therefore very different from that of their rapidly growing counterparts, which has important implication for the interpretation of transcriptome-wide data obtained from bacteria grown under different conditions. Triggering of stable RNA degradation does not require transcription or translation, leading us to propose a model in which surplus tRNA (and rRNA) is passively degraded whenever the demand for protein synthesis is reduced. Thus, in addition to the regulation at the level of synthesis, tRNAs (and rRNAs) are subject to demand-based regulation at the level of their degradation. We argue that the cellular tRNA pool is a highly dynamically regulated entity, and show an example of one surprising way in which the correct level of tRNAarg is important for multiple bacterial behaviors.

Short bio:
Sine Lo Svenningsen has been an associate professor at the Department of Biology, University of Copenhagen, since 2012. She obtained her PhD from Princeton University in the lab of Bonnie Bassler in 2008, and has worked at the National Cancer Institute at NIH, USA, as well as the University of Ottawa, Canada, before starting her independent research group in Copenhagen, where she mainly works on RNA-based mechanisms of gene regulation in bacteria.

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