RCB – Kolloquium

Donnerstag, 13. Februar 2025 14.00 Uhr
Neubau Biologie H 53

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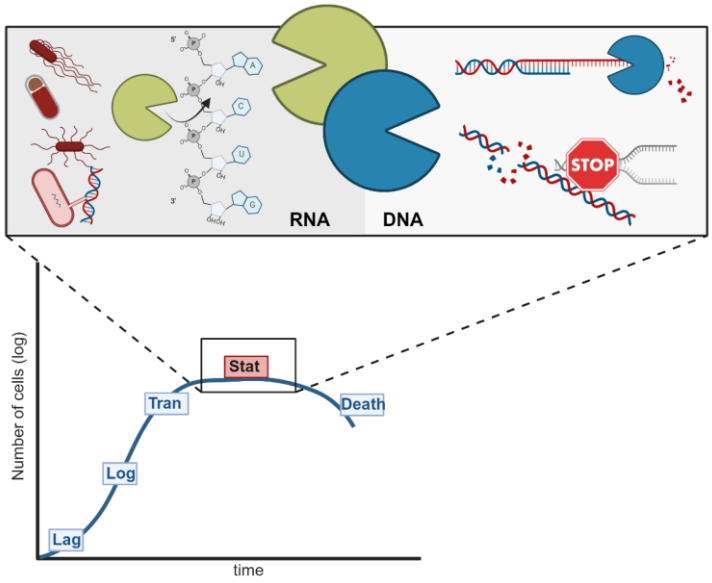
SYNMIKRO Synthetische Mikrobiologie

YhaM, a nuclease regulating uptake of DNA from the environment

The uptake of genetic material from the environment and its integration into the genome is a hallmark of bacteria, enabling the acquisition of novel traits such as antibiotic resistance. This process requires the modification of nucleic acids taken from the environment. Here, we demonstrate that YhaM in *Bacillus subtilis* is a phylogenetically conserved 3′-deoxyribonuclease critical for efficient bacterial transformation. Furthermore, we show that YhaM is a nuclease with a strong preference for single-stranded DNA. Mechanistically, YhaM assembles into hexamers from dimers in the presence of divalent cations, which facilitates substrate binding.

Bacteria lacking the *yhaM* gene are unable to uptake self-replicating plasmids or genomic DNA. In contrast, the double-stranded DNA phage SPP1 can still successfully transduce the *yhaM* mutant. These findings suggest that YhaM plays a crucial role in the maturation of single-stranded DNA intermediates early during bacterial transformation, a function likely conserved among Gram-positive bacteria, including important pathogens as *Staphylococcus aureus.*



Research concept: Regulatory roles of ribonucleases and deoxyribonucleases during cell differentiation and stress responses. Created with BioRender.com

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