SFB 680

Molecular Basis of Evolutionary Innovations

Molekulare Grundlagen evolutionärer Innovationen

Barbara di Ventura

Zentrum für Molekulare Biologie, Universität Heidelberg

Divide et impera Bacterial strategy to partition Min proteins during cell division

Symmetrically dividing bacteria need to equally partition their cytoplasmic and genomic contents between daughter cells at division. While for homogeneously distributed proteins this is readily achieved, dedicated mechanisms must exist to segregate proteins that possess a specific address within the cell. Given their highly inhomogeneous distributions, the Min proteins represent an interesting system to study during cytokinesis. Oscillating from pole to pole, the Min proteins allow the assembly of the divisome at mid-cell only, where the lowest levels of the inhibitor, MinC, are encountered. The mechanism behind their partitioning in a cell progeny is unknown and this is, counter-intuitively, predicted to be uneven by computational models. Using a combination of in vivo and in silico analyses, we show that daughter cells start off with roughly equal amounts of Min proteins. Surprisingly, highly septated cells have “half-cell to half-cell” rather then “pole to pole” oscillations, which eventually become independent into each daughter cell before completion of cytokinesis, resulting in a final equilibration of Min proteins. Simulations of a stochastic 3D model reveal that this mechanism self-arises from the interplay between the cellular geometry and the intrinsic properties of the Min proteins.

June 1, 2010

5:00 p. m.

Institute for Genetics, Lecture Room, ground floor

Host: Michael Lässig

www.sfb680.uni-koeln.de