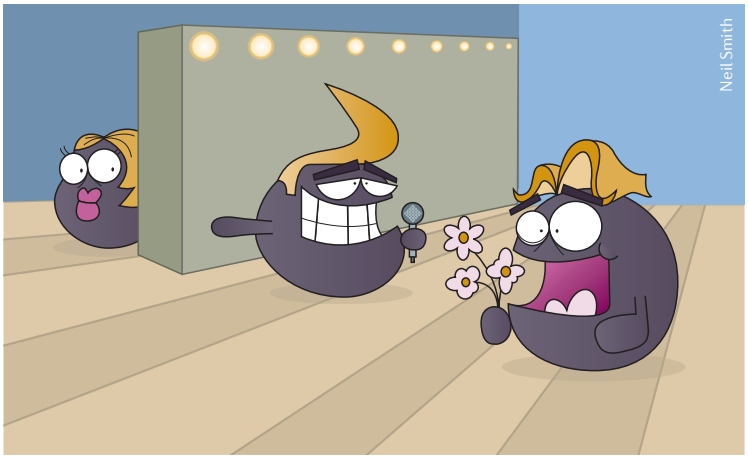
BACTERIAL PHYSIOLOGY

Opportunity Nocs

During cell division in *Bacillus subtilis*, the tubulin homologue FtsZ is positioned at the mid cell, where it recruits other components of the 'divisome' machine that together catalyse formation of the septum. Positioning of the divisome at the mid cell is achieved through the integration of signals from the Min system, which prevents division at the cell poles, and the nucleoid occlusion system, which prevents division in the vicinity of the chromosome. In a study published online in *The EMBO Journal*, Wu *et al.* describe the identification of DNA binding sites on the *B. subtilis* chromosome for the nucleoid occlusion protein Noc, and suggest that Noc functions not only as a spatial regulator for division but also as a temporal regulator.



> "…Noc functions not only as a spatial regulator for division but also as a temporal regulator."

The authors found that Noc localized to the nucleoid and cell periphery in a dynamic manner, but there were frequent gaps in the localization pattern in the vicinity of the replication terminus (*terC*). The absence of Noc from this region might allow FtsZ to assemble at the mid cell before chromosome replication has been completed. Using chromatin affinity purification followed by microarray analysis (ChAP-on-chip), the authors identified discrete foci of Noc binding, scattered around the chromosome except for the *terC* region. A bioinformatic probe of these regions identified a 14 bp motif that constituted the Noc binding sequence (NBS), which was confirmed to be both necessary and sufficient to recruit Noc. Interestingly, the insertion of eight NBS motifs into the *terC* region led to an increase in cell length, suggesting that the absence of Noc binding in this chromosomal region is important for the correct timing of cell division. To test this, the authors introduced an autonomously replicating plasmid bearing NBS motifs that they reasoned would be less positionally constrained than the chromosome, allowing Noc to remain at the mid cell throughout the cell cycle. The presence of this plasmid caused a filamentous phenotype, which was indicative of a block in cell division.

Further work to determine the precise nature of the interaction between Noc and the divisome machinery is required.

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ORIGINAL RESEARCH PAPER Wu, L. J. *et al.* Noc protein binds to specific DNA sequences to coordinate cell division with chromosome segregation. *EMBO J.* 4 Jun 2009 (doi:10.1038/emboj.2009.144)