How to control the size of a fission yeast cell

Martin Howard

John Innes Centre
Norwich, UK

In this talk I will discuss how fission yeast cells control their size[1]. It has previously been proposed that fission yeast implements a "sizer" mechanism, where cells actively monitor their size and divide upon reaching a critical size. However, which measure of size is monitored and how has been unknown. Here, we propose a theory that explains how size control is implemented via an effective measurement of the plasma membrane surface area through the cortical dynamics of the protein Cdr2. Predictions from this theory are then successfully tested in the lab. I will also briefly point out that a similar control mechanism may be implemented in a completely different problem, namely equal spacing of low copy number plasmids in bacteria[2].

[1] K. Pan, T. Saunders, I. Flor-Parra, M. Howard and F. Chang: Cortical regulation of cell size by a sizer cdr2p, eLife **3** e02040 (2014)
[2] R. Ietswaart, F. Szardenings, K. Gerdes and M. Howard: Competing ParA Structures Space Bacterial Plasmids Equally over the Nucleoid, PLoS Comput. Biol. **10** e1004009 (2014)