Indian Institute of Technology Delhi

DEPARTMENT OF BIOCHEMICAL ENGINEERING & BIOTECHNOLOGY

2016-17 Seminar Series

Friday, January 06, 2017

Frequency Doubling in Cyanobacterial Circadian Clock

Dr. Arijit Kumar Das
The Sainsbury Laboratory
University of Cambridge, Cambridge, UK

Organisms use circadian clocks to generate 24-h rhythms in gene expression. However, the clock can interact with other pathways to generate shorter period oscillations. It remains unclear how these different frequencies are generated. In this piece of work, we examine this problem by studying the coupling of the clock to the alternative sigma factor *sigC* in the cyanobacterium *Synechococcus elongatus*. Using single-cell microscopy, we find that *psbAI*, a key photosynthesis gene regulated by both *sigC* and the clock, is activated with two peaks of gene expression every circadian cycle under constant low light. This two-peak oscillation is dependent on *sigC*, without which *psbAI* rhythms revert to one oscillatory peak per day. We also observe two circadian peaks of elongation rate, which are dependent on *sigC*, suggesting a role for the frequency doubling in modulating growth. We propose that the two-peak rhythm in *psbAI* expression is generated by an incoherent feedforward loop between the clock, *sigC* and *psbAI*. Experiments and modelling suggest that this could be a general network motif to allow frequency doubling of outputs.

All are welcome

Seminar will be held in DBEB SEMINAR ROOM at Block I, Room 223 at 4 PM
For additional information, contact Seminar coordinator D. Sundar at sundar@dbeb.iitd.ac.in