QBiC SEMINAR

Speaker

Marc Lefranc, Ph.D.

CNRS – Université Lille

Date & Location

Tuesday, July 22, 2014 16:00 - 16:45

Kobe CDB A7F Seminar room (2-2-3 Minatojima-minamimachi, Chuo-ku, Kobe)
***There will be a video broadcast in OLABB 1F lounge.**

Title

Entrainment of circadian clocks in all weather and seasons: lessons from a picoalga

Abstract

Most living organisms are exposed periodic environmental changes due to Earth rotation and have accordingly evolved a circadian clock keeping the time of the day. At organismal level, circadian clocks rely primarily on the alternation of light and dark to synchronize to the day/night cycle. However, a consequence of weather fluctuations and seasonal variations is that the driving signal received by the clock is highly variable not only from one day to the next but also throughout the year, which may destabilize the clock.

The analysis of expression data from the core clock genes of a small microscopic green alga, *Ostreococcus tauri* suggests a simple yet effective strategy to protect the clock from fluctuations in daylight intensity, which effectively decouples the clock from the external cycle when it is on time [1,2,4]. Being robust to these fluctuations appears to be sufficiently important that this strategy can be evidenced for all day durations between 2 and 22 hours, despite the fact that the expression profiles significantly depend on photoperiod [3,4]. This shows that a circadian clock can be both robust and flexible, using simple principes from nonlinear oscillator physics. However, it is still not clear how to implement these mechanisms into a fully mechanistic mathematical model, as we will discuss with one model from the literature and one model testing a standing hypothesis about *O. tauri* light input pathway [5].

To conclude, we will show preliminary results regarding the mammalian circadian clock in a peripheral organ, the liver [6], which is primarily driven by the feeding/fasting cycle. We will see that here also, experimental time profiles from an entrained clock can be close to those of a free-running mathematical model.

[1] Thommen et al., PLoS Comput Biol 6(11): e1000990 (2010). [2] Pfeuty et al., Biophys. J. 100, 2557 (2011). [3] Thommen et al., FEBS Journal 279, 3432 (2012). [4] Pfeuty et al., BioEssays 34, 781 (2012). [5] Thommen et al., submitted to Frontiers in Genetics (2014) [6] Woller et al., in preparation.

Host

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