Circadian clocks produce a biological measure of the time of day. My lab studies the molecular biology of how circadian regulation improves plant performance.

Circadian regulation is crucial in plants because circadian regulation increases photosynthesis and productivity substantially (Dodd et al. Science 2005) and controls seasonality of flowering.

We are investigating the following:

1. How does the circadian clock control the photosynthesis?

There are circadian rhythms of photosynthesis, but it is not known how the circadian clock regulates the photosynthetic apparatus.

2. How does the circadian clock co-ordinate cell signalling and membrane transport?

Membrane systems are a crucial focus in plants for abiotic stress responses, photosynthesis, water fluxes and signal transduction.

3. How is the circadian clock tailored to physiologically-relevant cell types?

A small number of cell types in plants have a disproportionately large impact on water use and stress tolerance. This includes the stomatal guard cell and root endodermis. We are investigating how circadian regulation in these cell types optimizes plant performance because the environment is characterized by 24 h cycles of water availability.

These images show circadian changes in the activity of the promoter of a circadian clock gene in Arabidopsis thaliana.
Lab members

Fiona Belbin (PhD student)
Dora Cano-Ramirez (PhD student)
Noriane Simon (PhD student)
David Cuitun Coronado (PhD student)
Lauren Hibbert (MSc student)

Lab alumni

Dr Kelly Atkins
Dr Jelena Kusakina (now a post-doc in Prof. Brendan Davies’ lab at the University of Leeds)
Dr Zeenat Noordally (went on to be a post-doc in Prof. Andrew Millar’s in Edinburgh and now at the University of Geneva)
Dr Yuanhua Zhang (CSC research fellow)
Dr Sarah Wetherill
Dr Anupama Chembath
Aline Yochikawa (student at UNICAMP Brazil)
Angela Fernandez-Lopez
Shogo Nagano (PhD student at Osaka Prefectural University)
Kester Cragg-Barber

Biography

2012 - present
Royal Society University Research Fellow and Proleptic Lecturer, University of Bristol

2008 - 2012
Royal Society University Research Fellow, Department of Biology, University of York

2007 - 2008
Broodbank Research Fellow, Department of Plant Sciences, University of Cambridge

2000 - 2007
Post-doctoral Research Associate, Department of Plant Sciences, University of Cambridge

Activities / Findings

Selected publications


Memberships

Organisations

School of Biological Sciences

Research groups

• Plant and Agricultural Sciences

Labs

• Circadian Biology

Recent publications

• Belbin, F & Dodd, A, 2018, 'ABA signalling is regulated by the circadian clock component LHY'. New Phytologist, vol 220., pp. 661-663
• Belbin, F, Fraser, D, Comben, N & Dodd, A, 2018, 'Plant circadian rhythms and vertical agriculture'. in: Plant factory using artificial light. Elsevier, pp. 79-88
• Ramirez, DC, Fraine, Sd, Griffiths, O & Dodd, A, 2018, 'Photosynthesis and circadian rhythms regulate the buoyancy of marimo lake balls'. Current Biology, vol 28., pp. R869-R870
• Simon, N, Sawkins, E & Dodd, A, 2018, 'Involvement of the SnRK1 subunit KIN10 in sucrose-induced hypocotyl elongation'. Plant Signaling and Behavior.
• Fraser, DP, Sharma, A, Fletcher, T, Budge, S, Moncrieff, C, Dodd, AN & Franklin, KA, 2017, 'UV-B antagonises shade avoidance and increases levels of the flavonoid quercetin in coriander (Coriandrum sativum)'. Scientific Reports, vol 7.

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