

# Colloquium scientifico: Dissecting temperature sensing and epigenetic switching using computational modelling and experiments

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My group is studying the mechanistic basis of epigenetic regulation in the Polycomb system, a vital epigenetic silencing pathway that is widely conserved from flies to plants to humans. We use the process of vernalization in plants in our experiments, which involves memory of winter cold to permit flowering only when winter has passed via quantitative epigenetic silencing of the floral repressor FLC. Utilising this system has numerous advantages, including slow dynamics and the ability to read out mitotic heritability of expression states through clonal cell files in the roots. Using computational modelling and experiments (including ChIP and fluorescent reporter imaging), we have shown that FLC cold-induced silencing is essentially an all-or-nothing (bistable) digital process. The quantitative nature of vernalization is generated by digital chromatin-mediated FLC silencing in a subpopulation of cells whose number increases with the duration of cold. We have further shown that Polycomb-based epigenetic memory is indeed stored locally in the chromatin (in cis) via a dual fluorescent labelling approach. I will also discuss how further predictions from the computational modelling, including opposing chromatin modification states and extra protein memory storage elements, are being investigated. I will also discuss the mechanisms by which long term fluctuating temperature signals are sensed before being converted into digital chromatin states for long term memory storage.

## Department

**Presenter(s)** : Prof. HOWARD, Martin (John Innes Centre, UK)