Talk abstracts for Monday 28th October

Becca Asquith: The "stemness" of immune memory

Our immune system remembers previously encountered pathogens and mounts a quicker, more efficient response upon meeting the same pathogen for a second time. How this immune memory is maintained for decades is unknown. It has been hypothesised that there is a dedicated population of stem cells that maintain memory. A recently identified population, named TSCM cells, is a leading candidate for this stem cell-like population. Whether TSCM cells have the dynamic characteristics of stem cells has never been addressed in humans. We use mathematical modelling of experimental data from healthy human volunteers to address this question.

Sara-Jane Dunn: Automated Reasoning to Uncover the Structure and Function of Biological Programs

Cellular decisions are the output of complex biochemical information processing, as cascades of molecular interactions are triggered by input stimuli. Deciphering the organisation of critical regulatory interactions is a huge challenge, compounded by noisy and conflicting data. Against this backdrop, automated reasoning is a powerful methodology to navigate biological complexity, formalise current knowledge, and derive predictive explanations of dynamic cell behaviour. I this talk, I will introduce this approach, and demonstrate its utility to understand and predict the behaviour of embryonic stem cells.

Dora Tang: Bottom up synthetic cellularity

Living cells are well equipped in exploiting a large number of out of equilibrium processes to support life. A complete understanding of these mechanisms is still in its infancy due to the complexity and number of the individual components involved in the reactions. These reactions are spatially localized within membrane bound or membrane less compartments.

Creating artificial, cell-like structures which have the features of compartmentalization and the ability to contain reactions is an important route to designing, building and engineering synthetic cellular systems with specific complexity and function. This bottom up approach allows excellent control over the components and represents an interesting alternative to generating cellular models.

In this talk I will discuss strategies for the design and synthesis of membrane bound and membrane free compartments such as lipid vesicles, proteinosomes and coacervates and describe how these compartments may be used as platforms for implementing dynamical behaviours including: enzyme catalysis, intercellular communication or autocatalysis.