NUS National University of Singapore | Department of Biological Sciences Faculty of Science

SEMINAR

Friday, 3 May 2019 | 2pm | DBS Conference Room 1

Hosted by Dr Lau On Sun

Olivier Hamant heads the "Mechanotransduction in development" team at the Plant Reproduction and Development institute (INRA – CNRS – UCBL1 - ENS de Lyon, France). Bridging mechanics with molecular genetics and plant development, he and his collaborators showed that shape- and growth-derived forces channel key biological processes, such as cell growth, division, polarity and identity, with important implications in plant morphogenesis. He received several prizes, among which the "Laurier de l'INRA" in 2012. In parallel, he is also leading several projects in art, science and education around the central question of the Anthropocene.

Mechanical signals contribute to development

By **Olivier HAMANT**

Research Director at INRA in the Plant Reproduction and Development Laboratory, ENS Lyon, France

Multicellular organisms exhibit reproducible shapes, yet at the cell level, growth can be extremely heterogeneous and variable. What are the buffering mechanisms that filter such heterogeneitity and variability? Here we take the example of plant organs where final shape only depends on cell division and cell elongation. We and others showed that shape- and growth-derived forces act as signals that orient microtubules and cellulose microfibrils in the cell walls. This response channels key biological features, such as cell shape or cell division plane orientation. We found that such mechanical feedback contributes to organ shape reproducibility. Surprisingly, the response of microtubule to stress in the wild type is not optimal, but suboptimal. Notably, we show that phenotypic variability can also emerge from a too strong response to mechanical stress. Looking for molecular regulators of developmental robustness and transcriptional noise, we identified interactions with mechanotransduction players. Altogether, this work reveals the mechanical complexity behind the robustness of organ shapes, and puts forward the question of suboptimality in biology.