



Grands Séminaires du Collège de France

Centre Interdisciplinaire de Recherche en Biologie du Collège de France

Le vendredi 27 avril 2018

à 16h00
Salle D2
(accès public)

Dr James Sharpe

Multicellular systems biology, EMBL



The grand challenge of multicellular systems...

Abstract: James Sharpe heads the new EMBL outstation in Barcelona. His work focuses on understanding vertebrate limb development as a model system for organogenesis. To this end, he has brought together biologists, physicists, and computer scientists. The questions they focus on, range from “How do networks of genes control populations of cells?” to “How do large-scale tissue movements influence gene regulation and other molecular events?” His long-term goal is to create a multi-scale model of mammalian limb development, successful enough to predict mutant phenotypes. Reaching that goal requires both pioneering 3D imaging technologies and developing multi-scale computer simulations to capture and understand gene activity over space and time. Indeed, combining experiments and modelling, James has found groundbreaking evidence supporting the idea that digit patterning is achieved by a Turing reaction-diffusion system, and more recently he has shown that this particular molecular system has been conserved all the way from fish to mammals. Finally, James is perhaps best known for inventing the 3D imaging technique called Optical Projection Tomography (OPT). The other major goal of his lab is to continue improving 3D and 4D imaging technology, including the development of time-lapse imaging of mouse limb development *in vitro*.

Key literature:

TEDx talk: <https://youtu.be/CtiZeTPzExE>

Imaging:

Sharpe et al. Science 2002

Boot et al. Nature Methods 2008

Vertebrate limb development:

Sheth et al. 2012, Science

Raspopovic et al. 2014, Science

Uzkudun et al. 2015 Molecular Systems Biology

Onimaru et al. 2016, Nature Communications

Theory of patterning gene networks:

Cotterell et al. 2010, Molecular Systems Biology

Jimenez et al. 2015, PNAS

Jimenez et al. 2017, Molecular Systems Biology

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