Invité par l'Assemblée du Collège de France,
sur proposition du pr **Thomas Lecuit**.

Rob PHILLIPS

CALIFORNIA INSTITUTE OF TECHNOLOGY

Conférences en anglais

9 > 30 mai 2022

Salle 2, Site Marcelin Berthelot

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9 mai 2022 à 17h – Lecture 1

Biological Numeracy: What Sets the Scale of X?

The first lecture introduces the philosophical contours of my view of modern quantitative biology, culminating in a definition of understanding that can answer the question of what sets the scale of biological sizes, time scales, concentrations, rates, energies and beyond. Two case studies illustrate the general idea: what sets the rate of bacterial division and what sets the size of cells?

16 mai 2022 à 17h – Lecture 2

Biology's Greatest Model and the Second Secret of Life

One of the primary quantitative languages in thinking about biological processes is the theory of probability. After introducing the great probability distributions, we turn to a powerful case study by examining the phenomenology of allostery. The quantitative analysis of allosteric proteins within the framework of the Monod-Wyman-Changeux model will allow us to see the unity between diverse processes such as transcriptional regulation, ion channel gating and receptor-mediated signaling.

23 mai 2022 à 17h – Lecture 3

Life as Defiance: Demonic Biology

It is fascinating to think about life when viewed through the prism of nonequilibrium physics. In this lecture, we begin by exploring the nature of the various "biological batteries" that power the lives of cells. With these general ideas in hand, we then turn to a particular example of pumping molecules up their concentration gradient in much the same way envisaged by James Clerk Maxwell in his famed demon.

30 mai 2022 à 16h – Lecture 4

A Language Whose Characters are Triangles

This final lecture explores the deep question of the nature of biological mechanism. Though often a molecular perspective is viewed as being essential, here we pivot instead towards ideas from the field theory of active matter to consider examples ranging from herds of wildebeest to the motion of actin in parasites.

COLLÈGE DE FRANCE
1530

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