



Stephen QUAKE

Head of Science at the Chan Zuckerberg Initiative
and Lee Otterson Professor at Stanford University

Hosts: Edith Heard, Thomas Lecuit and Hugues de Thé

These four lectures explore fundamental aspects of cellular biology and their medical applications. The first lecture, «Understanding the mysteries of the cell: how do many cell types arise from one genome?», examines how diverse cell types emerge from identical genetic material. It describes the creation of a human reference atlas with over one million cells from 24 tissues, characterizing more than 400 cell types and their tissue-specific gene expression patterns.

The second lecture, «Understanding the mysteries of the cell: how do mutations arise in our bodies?», investigates the origins of genetic mutations. It connects historical debates about bacterial mutations to modern questions about human genetic diversity, discussing how single-cell genomics has illuminated the evolutionary history of mutations, including those leading to cancer.

The third lecture, «Understanding the mysteries of the cell: our immune repertoire viewed through Darwin's eyes», addresses the immune system's antibody diversity. It explores mechanisms of antibody formation, including gene segment recombination and sequence diversification, while examining fundamental questions about repertoire expression and similarity between individuals.

The final lecture, «Medical innovations from the genome revolution: liquid biopsies», highlights a practical application of genomic knowledge. It describes how circulating cell-free nucleic acids, discovered in 1948, have been combined with high-throughput sequencing to develop non-invasive diagnostic tests that have replaced traditional biopsies for millions of patients in fields including pregnancy, transplant medicine, infectious disease, and cancer.

Stephen QUAKE

Understanding the mysteries of the cell

May 2025 - September 2025

COLLÈGE
DE FRANCE

— 1530 —

Thomas Römer
Administrateur du Collège de France
11, place Marcelin-Berthelot, 75005 Paris
www.college-de-france.fr

12 May 2025 - Amphithéâtre Maurice Halbwachs, 17h-18h

Understanding the mysteries of the cell:
how do many cell types arise from one genome?

26 May 2025 - Amphithéâtre Maurice Halbwachs, 17h-18h

Understanding the mysteries of the cell:
how do mutations arise in our bodies?

8 September 2025 - Amphithéâtre Maurice Halbwachs, 17h-18h

Understanding the mysteries of the cell:
our immune repertoire viewed through the Darwin's eyes

22 September 2025 - Amphithéâtre Maurice Halbwachs, 17h-18h

Medical innovations from the genome revolution: liquid biopsies