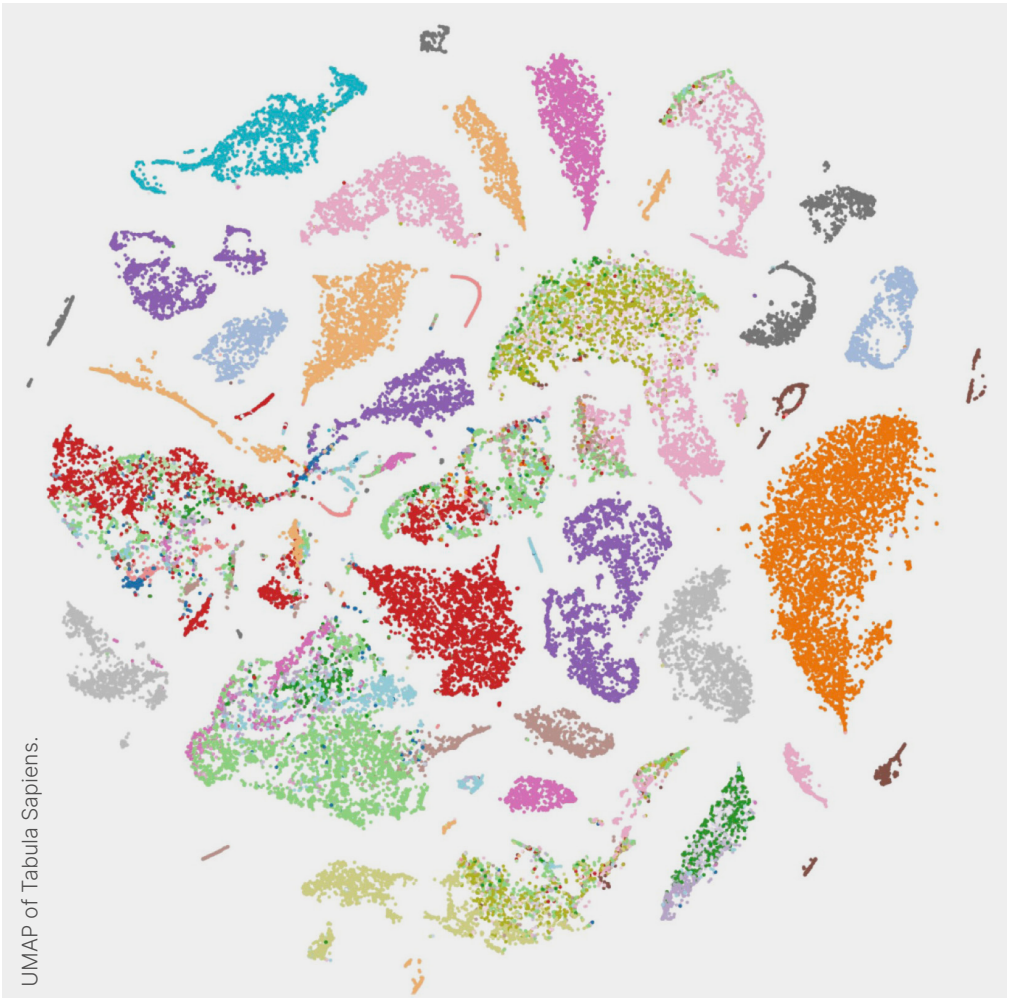

UMAP of Tabula Sapiens.

Stephen QUAKE

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

Understanding the mysteries of the cell

8 & 22 September 2025

COLLÈGE DE FRANCE
1530

Thomas Römer
Administrateur du Collège de France
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Année académique
2025/2026

Stephen QUAKE

Head of Science at the Chan Zuckerberg Initiative
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Hosts: Edith Heard, Thomas Lecuit and Hugues de Thé

Understanding the mysteries of the cell

8 September 2025

Amphithéâtre Maurice Halbwachs, 17h-18h

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

The nature of the immune system's antibody repertoire has been a subject of fascination for more than a century. This repertoire is highly plastic and can be directed to create antibodies with broad chemical diversity and high selectivity. There is now a good understanding of the potential diversity available and the mechanistic aspects of how this diversity is generated. Antibodies are formed by a mixture of recombination among gene segments, sequence diversification at the junctions of these segments, and point mutations throughout the gene. However, certain very elementary questions have remained open more than a half-century after being posed: It is still unclear what fraction of the potential repertoire is expressed in an individual at any point in time and how similar repertoires are between individuals who have lived in similar environments. Moreover, because each individual's immune system is an independent experiment in evolution by natural selection, experiments about repertoire similarity also inform our understanding of evolutionary diversity and convergence. I will discuss how we have used high throughput sequencing to sequence immune repertoires in both humans and model organisms to address these questions.

22 September 2025

Amphithéâtre Maurice Halbwachs, 17h-18h

**Medical innovations from the genome revolution:
liquid biopsies**

One of the most important medical innovations to arise from the genome revolution is the development of liquid biopsies: simple blood tests which replace the need for invasive sampling in fields as diverse as pregnancy, transplant medicine, infectious disease, and cancer. Virtually all of these liquid biopsies are based on a physiological phenomenon discovered in Strasbourg in 1948: circulating cell free nucleic acids. Despite more than a half century of research, this phenomenon did not have a clinical use until it was paired with high throughput sequencing and knowledge of the human genome sequence. I will describe how our lab developed a variety of diagnostic tests which have replaced invasive biopsies and are now used by millions of patients each year.