CeMM LANDSTEINER LECTURES

Where babies come from: The invisible storyline of development, from zygote to newborn

Jay Shendure

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Festive Hall, Austrian Academy of Sciences
Dr.-Ignaz-Seipel-Platz 2, 1010 Vienna

Welcome by Maria Rescigno, CeMM Scientific Director
Denise P. Barlow Award Ceremony
Lecture by Jay Shendure
Cocktail reception

RSVP latest by 4 May 2026

Registration at: https://cemm.at/landsteiner

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Abstract

The house mouse is an exceptional model system in biology and medicine, combining powerful genetic tractability with close evolutionary affinity to humans. Mouse pregnancy lasts only three weeks, during which its genome orchestrates the astonishing transformation of a single-cell zygote into a free-living newborn composed of more than 500 million cells.

In this lecture, I will describe our ongoing efforts to reconstruct the entirety of mouse development at single-cell resolution using two complementary strategies. First, we analyze whole embryos at many different stages of development and measure the molecular state of individual cells. These high-resolution "snapshots" are then assembled computationally into a continuous time-lapse movie of development. Second, we use a method called "molecular recording", in which living cells become their own historians by writing information about molecular events during their development directly into their DNA. This allows us to reconstruct genetic family trees of cells and trace how different tissues and organs arise.

Finally, I will argue that model organisms remain indispensable in the age of AI, and that evolutionary transfer learning at the scale of the whole organism may represent our best path toward predictive models of human development, health, and disease.

CV

Jay Shendure, MD, PhD, is an Investigator of the Howard Hughes Medical Institute, a Professor of Genome Sciences at the University of Washington, and Scientific Director of the Seattle Hub for Synthetic Biology and the Brotman Baty Institute for Precision Medicine. His 2005 doctoral thesis with George Church included one of the first successful reductions to practice of next-generation DNA sequencing.

Dr. Shendure's laboratory pioneered exome sequencing and its earliest applications to gene discovery for Mendelian disorders and autism; cell-free DNA diagnostics for cancer and reproductive medicine; massively parallel reporter assays; saturation genome editing; combinatorial single-cell molecular profiling; and longitudinal molecular recording.

He is an elected member of the US National Academy of Sciences, the US National Academy of Medicine, and the American Association for the Advancement of Science. He is also a recipient of the Richard Lounsbery Award from the US National Academy of Sciences, the Mendel Award from the European Society of Human Genetics, and the Curt Stern Award from the American Society of Human Genetics. Dr. Shendure received his BA from Princeton University (1996) and his MD and PhD degrees from Harvard Medical School (2007).

Ron Wurzer/AP Images for HHMI

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