ETH zürich

ICB seminar series 2018/19
chairman: Prof. Dr. Chih-Jen Shih

BUILDING A SYNTHETIC CELL

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ETH Hönggerberg, HCI J 3
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Abstract: A cell is the common unit structure shared by all living organisms, but even 'simple' prokaryotic cells are extremely complex chemical reactors. One of the grand fundamental challenges of modern science is to reveal the basic operating principles of life. While we have extensive knowledge about the molecular building blocks that form the basis of modern life, we do not understand how these building blocks collectively operate to define life as we know it. Cellular life, which provides the fundament of all organisms, appears to be the result of a collection of highly controlled, energy consuming, dynamic self-assembly and self-organization processes that lead to autonomous entities that can reproduce, transfer information, interact, and evolve. Understanding the physical-chemical principles of these collective processes poses a formidable challenge, which needs to be overcome if we want to be able to understand life itself, and influence biological processes in a rational way in the future. Truly understanding life from the bottom-up will bring huge intellectual, scientific, and technological rewards. At the same time it will raise fascinating philosophical and ethical questions about how society may cope with new opportunities that result from this fundamental insight. In our research, we use microfluidic techniques to create cell-like environments that allow us to probe the impact of the physical aspects of the cell on key biochemical processes such as transcription and translation. I will also give an overview of our current attempts to reconstruct a living cell.

Bio: Prof. Wilhelm T. S. Huck received his PhD in 1997 from the University of Twente. After postdoctoral research at Harvard University, he joined the University of Cambridge, where he was promoted to Reader (2003) and Full Professor of Macromolecular Chemistry (2007). In 2010 he moved to the Radboud University in Nijmegen as Professor of Physical Organic Chemistry. His research interest centre around understanding life as a set of complex chemical reactions. He is Co-PI on a 18.8 M€ Gravitation Grant Building a Synthetic Cell (BaSyC), and received the Spinoza Prize (2016), a VICI award (2011) and ERC Advanced Grant (2010). Prof. Huck is a member of the Royal Netherlands Academy of Arts and Sciences.

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