



# ON-SITE BIOLOGY COLLOQUIUM

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Hosted by Asst. Prof Long Yuchen

## From single cells to multicellular life and vice versa

**By Xu Jian**

*Professor of Plant Systems Physiology,  
Radboud Institute for Biological and Environmental Sciences (RIBES),  
Radboud University, the Netherlands*



### **About the Speaker**

*Prof. Dr. Xu Jian obtained his Ph.D. in Molecular Genetics from Utrecht University, where he also conducted post-doctoral research funded by the prestigious Dutch Research Council (NWO) VENI talent programme. After completing his post-doctoral research, he joined the National University of Singapore as a tenure-track assistant professor. He was later promoted to tenured associate professor. In 2019, he joined Radboud University as the chair professor and head of the Department of Plant Systems Physiology. In his current role, he leads a multidisciplinary team that combines experimental and computational approaches to investigate the fundamental principles of cell development and adaptation. He has used innovative techniques, such as single-cell transcriptomics, to explore the intricacies of development and stress responses at the single-cell level. His work has helped to elucidate the molecular mechanisms that underlie plant growth, development, and stress tolerance.*

The transition from single-cell organisms to multicellular organisms is a pivotal step in the evolution of life. Despite their diverse forms and functions, all multicellular creatures trace their origins back to single-cell organisms. Understanding this shift requires investigating the division of labor among the cells within multicellular organisms. Advancements in single-cell transcriptomics have revealed the role of gene expression variations in generating the remarkable diversity observed among cells. By quantitatively analyzing gene expression patterns, we can uncover how specific gene programs are established under varying environmental conditions, including stress. One intriguing question pertains to the role of specific genes involved in crucial cellular processes, such as cell-cell adhesion, in the context of multicellularity. Although these genes exist in single-cell organisms, their utilization during the establishment of multicellular systems remains a mystery. Did the horizontal transfer and duplication of these genes, along with the selection and expansion of new gene functions, play a pivotal role in integrating cells into a cohesive multicellular entity? By addressing these questions, we gain insights into the captivating journey from unicellularity to multicellularity, deepening our understanding of life's complexity and the mechanisms that facilitated the emergence of multicellular organisms.