NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

BIOLOGY COLLOQUIUM

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Hosted by Associate Professor Christoph Winkler

Cytoplasmic gene expression in eukaryotes: lessons from poxviruses

By **Utz Fischer**

Professor, Chair of Biochemistry, Theodor-Boveri-Institute at the Biocentre, University of Würzburg, Am Hubland

About the Speaker

Utz Fischer studied biochemistry at the Free University of Berlin (Germany). He carried out his doctorate (1989-1992) and his first postdoctoral research (1992-1995) at the University in Marburg (Germany). As a DKFZ Fellow (AIDS Scholar), he conducted research between 1995 and 1997 at the Howard Hughes Medical Institute of the University of Pennsylvania (USA). From 1997 to 2003 he headed an independent research group at the Max Planck Institute for Biochemistry (Germany). Since 2003 he is the head of the Department of Biochemistry at the University of Würzburg (Germany). He has been an associated member of the Helmholtz Institute for RNA-based Infection Research (HIRI) since 2019 and Associate Director of the Cancer Therapy Research Center (CTRC) at the University of Würzburg since 2018. Utz Fischer's research deals with the biogenesis, structure and function of macromolecular machines involved in RNA metabolism and their role in viral infections and human diseases.

In eukaryotic cells, the process of gene expression is confined to the nucleus and enabled by multi-subunit RNA polymerases (RNAPs). Many viruses make use of the cellular gene expression apparatus during infection, and hence transfer their genome at least transiently to the host nucleus. However, poxviruses have evolved a different strategy to propagate: Their double-stranded DNA genome is transcribed in the host cytoplasm by a virus-encoded multi-subunit RNA polymerase (vRNAP). Whereas the vRNAP core enzyme is evolutionarily related to eukaryotic RNA-Polymerase II, its associated transcription and mRNA processing factors are remarkable divergent. I will present high-resolution structures of the poxviral transcription apparatus in different phases of action that we have recently solved. These structures along with biochemical studies enabled unprecedented insight into a unique cytosolic gene expression machinery and allow to define a comprehensive model of poxviral gene expression and its regulation.