

# SINERGY SEMINAR SERIES

NUS Synthetic Biology for Clinical and Technological Innovation (NUS SynCTI)  
Member of Singapore Consortium for Synthetic Biology (Sinergy)



## Professor Robert C. Robinson

Research Institute for Interdisciplinary Science, Okayama University, Japan  
Biomolecular Science and Engineering (BSE), Vidyasirimedhi Institute of Science and  
Technology (VISTEC), Rayong, Thailand

### Structural Evidence for A Functional Actin Cytoskeleton in Asgard Archaea

The origin of the eukaryotic cell is unresolved. Metagenomics sequencing recently provided evidence for several potential eukaryotic gene homologs in the Asgard archaea. However, many of these eukaryotic-like sequences are highly divergent and the organisms have yet to be imaged or cultivated, bringing in to question whether these archaea exhibit eukaryotic characteristics. Here we explore the properties of putative cytoskeletal proteins from Asgard archaea. We determine that the Asgard genomes encode functional profilins and gelsolins, establishing that these archaea have a regulated actin cytoskeleton, one of the hallmarks of the eukaryotic cell. Thus, Asgard archaea possess an ancient polar and regulated actin system, which is likely to integrate force into membrane remodeling processes through directed polymerization. Since Asgard archaea are also predicted to encode potential eukaryotic-like genes involved in membrane trafficking and endocytosis, it is probable that actin polymerization drives membrane perturbations and organization.

*Bob obtained a BSc (1987) in Chemistry from King's College, London University, an MSc (1990) in Biochemistry from University of British Columbia, and a DPhil (1996) in Structural Biology from Oxford University. During his postdoctoral studies at the Salk Institute for Biological Studies (1996-2001), Bob solved the X-ray structure of Arp2/3, an actin-nucleating complex consisting of seven proteins. In 2001, Bob was appointed as a Senior Lecturer at Uppsala University. There, the research group continued to elucidate structures of key actin-regulating proteins. Bob became an EMBO Young Investigator in 2003. Bob joined IMCB, Singapore as a Principal Investigator in 2005 and became a Research Director in 2011. Bob is currently holds Professor positions at RIIS, Okayama University and VISTEC, Thailand.*

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