

SINERGY SEMINAR SERIES

NUS Synthetic Biology for Clinical and Technological Innovation (NUS SynCTI)

Member of Singapore Consortium for Synthetic Biology (Sinergy)



Professor John A. Gerlt

Institute for Genomic Biology

Departments of Biochemistry and Chemistry

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EFI Genomic Enzymology Web Tools (EFI@Illinois): Discovery of Novel Enzymes and Metabolic Pathways

The number of proteins in the UniProt database (>182M sequences in Release 2019_10) is increasing with a doubling time of ~2.5 years; however, $\geq 50\%$ of the proteins have uncertain, unknown, or incorrect functions. This lecture will describe the Enzyme Function Initiative web resource for genomic enzymology tools for leveraging the protein, genome, and metagenome databases to discovery novel enzymes and metabolic pathways. The resource includes tools for 1) generating protein sequence similarity networks (SSNs; EFI-EST; efi.igb.illinois.edu/efi-est/) to explore sequence-function space in protein families, 2) generating genome neighborhood networks (GNNs; EFI-GNT; efi.igb.illinois.edu/efi-gnt/) for identifying functionally linked genes/proteins in metabolic pathways, and 3) chemically guided functional profiling (CGFP) for mapping metagenome abundance to clusters in SSNs (EFI-CGFP; efi.igb.illinois.edu/efi-cgfp/). Examples will be given of metabolic pathways that have been discovered using these tools. The lecture also will describe development of a new web resource ("radicalSAM.org") to facilitate access to the very large radical SAM enzyme superfamily (512K sequences). Supported by NIH U54GM093342 and P01GM118303.

John A. Gerlt is Gutsell Chair and Professor of Biochemistry and Chemistry at the University of Illinois, Urbana Champaign, where he is a member of the Mining Microbial Genomes theme in the Institute for Genomic Biology. Gerlt received his B.S. from Michigan State University in 1969, his Ph.D. from Harvard University in 1974, and was a Jane Coffin Childs Postdoctoral Fellow at the National Institutes of Health from 1974-75. He held faculty positions in the Departments of Chemistry at Yale University and the University of Maryland, College Park, before assuming his present position at the University of Illinois in 1994. Gerlt was PI/PD of the Enzyme Function Initiative, a Large Scale Collaborative Project supported by NIH/NIGMS, focused on developing tools and strategies for assigning functions to uncharacterized enzymes discovered in genome project.

Gerlt's research interests are in mechanistic and genomic enzymologies, with a primary focus on the evolution of functionally diverse enzyme superfamilies. To enable these projects, he has overseen the development of a publicly accessible ("democratized") web resource that provides community access to genomic enzymology tools for generating sequence similarity networks (SSNs) and genome neighborhood networks as well as chemically guided functional profiling (CGFP) for mapping metagenome abundance to clusters in SSNs.

10th December 2019, Tuesday | 4pm
MD7 M9 Seminar Room (#02-03)

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Hosted by: A/Prof Yew Wen Shan

