



CHEMISTRY & BIOCHEMISTRY

SEMINAR PROGRAM

DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY
UNIVERSITY OF OKLAHOMA

NORMAN, OK 73019-3051 ★ (405) 325-4811 ★ FAX: (405) 325-6111

MYCOBACTERIUM MINI-SYMPOSIUM

Facilitator: Dr. Helen Zgurskaya

February 5, 2025, 9:00 a.m. to 11:40 a.m.

Stephenson Life Science Research Center Room 3410/3430-Astellas Room

Program:

9:00 a.m.	Introductions	Dr. Helen Zgurskaya
9:10 a.m.	The Mycobacterial Cell Envelope: Therapeutic Target and Role in Pathogenicity	Dr. Mary Jackson Colorado State Univ.
10:00 a.m.	Structure of MmpL5	Dr. Edward Yu Case Western Reserve University
10:50 a.m.	Chemical Probes to Study the Mycobacterial Envelope: Development and Uses	Dr. Benjamin Swarts Central Michigan Univ.
11:30 a.m.	Discussions and Questions	

Background:

Tuberculosis and non-tuberculous mycobacterial infections are notoriously difficult to treat, requiring long courses of intensive multi-drug therapies associated with adverse side effects. The biology of mycobacteria is dominated by a complex cell envelope of unique composition and structure and of exceptionally low permeability. This cell envelope is the basis of many of the pathogenic features of mycobacteria and the site of susceptibility and resistance to many antibiotics and host defense mechanisms. This mini symposium is focused on the transporters that assemble and functionalize this complex structure. It highlights both the progress and the limits of our understanding of how (lipo)polysaccharides, (glyco)lipids, and other bacterial secretion products are translocated across the different layers of the cell envelope to their final extra-cytoplasmic location.

Dr. Mary Jackson

Dr. Mary Jackson currently is a Professor of Bacteriology in the Department of Microbiology, Immunology, and Pathology at Colorado State U. She earned a Bioengineering degree and an MSc. degree from the National School of Agronomy, Rennes, France in 1994, and a Ph.D. degree in Biochemistry, and Cellular and Molecular Biology from the Pasteur Institute, Paris, France, in 1998. After postdoctoral training at CSU under Prof. Patrick J. Brennan, she returned to the Pasteur Institute where she worked as a Research Scientist in the Mycobacterial Genetics Unit. In 2007, she moved back to CSU as an assistant professor, where she has been leading her research program on critical aspects of the physiology of mycobacterial pathogens with the goal of informing novel therapeutic strategies. Dr. Jackson has published over 200 peer-reviewed scientific articles and serves on numerous grant review panels for Federal, private, and non-profit funding agencies globally

Dr. Edward Yu

Dr. Ed Yu completed a B.Sc. from Southern Illinois University in 1989 and a Ph. D in Physical Chemistry from the University of Michigan in 1997. His postdoctoral training was in the lab of Daniel E. Koshland at the University of California, Berkeley. Since 2017, Dr. Yu has been a Professor of Pharmacology at Case Western University. The main research focus of the Yu lab is to determine the Structure, assembly, and substrate transport mechanisms of the resistance-nodulation-cell division (RND)-superfamily of efflux pumps. X-ray crystallography/cryo-electron microscopy and other biophysical/biochemical techniques are used by the Yu lab to solve the structures of these efflux pumps, both alone and in conjunction with a variety of inhibitory compounds. This structural information, combined with molecular docking studies, provides the foundation for identifying and developing new, potent molecules to help treat bacterial infections that cannot be cured with the currently available antibiotics. Dr. Yu is a fellow of the American Academy of Microbiology, the American Physical Society, and the American Association for the Advancement of Science.

Benjamin M. Swarts

Benjamin M. Swarts grew up in Danville, Ohio, USA. He completed a B.A. in Chemistry from the College of Wooster in 2004 and a Ph.D. in Chemistry from Wayne State University in 2010 with Prof. Zhongwu Guo, studying the synthesis of glycosylphosphatidylinositol anchors. After a postdoctoral fellowship focused on the study of mycobacterial glycolipids with Prof. Carolyn Bertozzi at the University of California, Berkeley, in 2013, he joined the faculty at Central Michigan University. His research focuses on the synthesis of bacterial carbohydrates and the development of probes and inhibitors to investigate bacterial cell envelope components, with a focus on the mycobacterial outer membrane. He has received the International Carbohydrate Organization Young Researcher Award, the Cottrell College Science Award, the Henry Dreyfus Teacher-Scholar Award, the NSF CAREER Award, and the Mid-American Conference Outstanding Faculty Award.