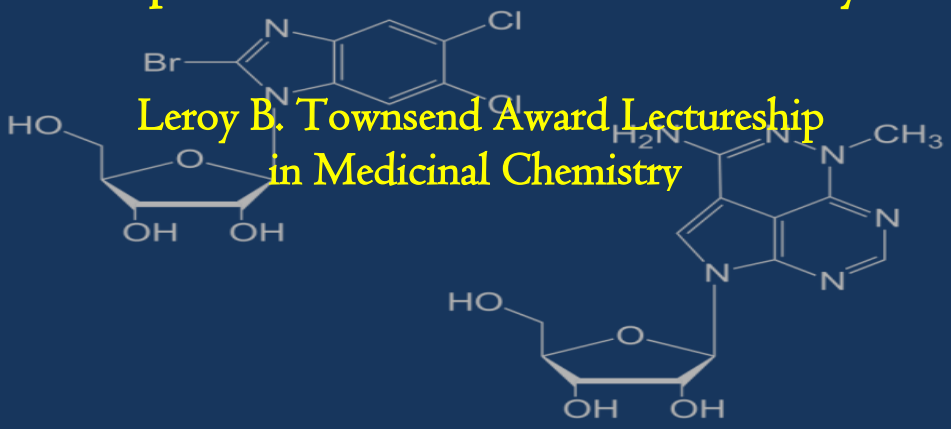
University of Michigan
Department of Medicinal Chemistry



Leroy B. Townsend Award Lectureship
in Medicinal Chemistry

"Exploiting Microbial Genomes to Access New Enzymology and Valuable Chemicals"

Yousong Ding, Ph.D.

Assistant Professor of Medicinal Chemistry, University of Florida, Gainesville, FL; Medicinal Chemistry Alumnus of 2010

Thursday May 17, 2018
2:00 p.m.
1544 North University Ave. Building*

*Building formerly known as C. C. Little

Reception preceding lecture at 1:30 p.m. in room 2548 North University Ave. Building.*

Exploiting Microbial Genomes to Access New Enzymology and Valuable Chemicals

Abstract:

Natural products-based drug discovery has achieved tremendous successes, but the high rate of rediscovery and limited chemical supply are two major challenges the field is facing. On the other hand, recent advances of DNA sequencing techniques illuminate extraordinarily rich potential of microbial strains for drug discovery and development, of which we have only tapped the surface. Over the past several years, my research laboratory has focused on the exploitation of microbial genomes to access new enzymology and valuable substances. In this talk, I will share our recent studies in the discovery of new enzymology and the production of chemicals. Specifically, we characterized the catalytic features of one ATP-grasp ligase in modifying multiple core peptides within a single substrate in the biosynthesis of one ribosomally synthesized and post-translationally modified peptide (RiPP) microviridin. Microviridins possess potent and selective inhibitory activity toward serine proteases, some of which are proven targets of FDA-approved drugs. Our work shows the distributive and unstrictly directional modifications of the enzyme, which fundamentally advances the understanding of modular RiPP biosynthesis. In addition, we have developed synthetic biology tools and approaches to produce natural products from microbial genomes. Our progresses are highlighted by two examples. In the first example, I will discuss the production of eco-friendly sunscreen shinorine using *Synechocystis* sp. PCC 6803, a new synthetic biology chassis with broad applications in cyanobacterial natural product research. The high-yield synthesis of agriculturally valuable bioherbicide thaxtomins in nonnative hosts will serve as the second example. Thaxtomins, determining virulent factors of tens of plant pathogenic *Streptomyces* strains, has been approved as bioherbicides by EPA but not commercialized mainly due to the low productivity of native producers. Our research improved its productivity by 20 folds, a critical step toward its use in agriculture. Overall, our work suggests the promising potential of microbial genomes for basic and translational research.

Yousong Ding, Assistant Professor of Medicinal Chemistry, University of Florida, Gainesville, FL

Dr. Yousong Ding is currently an assistant professor of Medicinal Chemistry, College of Pharmacy at the University of Florida, Gainesville. He received a Ph.D. in Medicinal Chemistry from the Department of Medicinal Chemistry at the University of Michigan under the supervision of Professor David H. Sherman in 2010, and then pursued a postdoctoral training with Professor Frances. H. Arnold at Caltech. Dr. Ding returned back to Michigan to work in Pfizer, Inc. (Kalamazoo, MI) in 2012, and then started his independent career at UFL in July, 2013. His research group mainly focuses on discovering and developing bioactive substances from nature for existing and emerging medical needs by using interdisciplinary approaches in medicinal chemistry, microbiology, molecular biology, cell biology, protein science, and synthetic biology. At UFL, Dr. Ding has published 20 papers and filed 10 disclosures, which broadly cover organic synthesis, synthetic biology, natural products, biocatalyst development, antimicrobial agents, and functional characterization of bioactive proteins. His work has been recognized with several awards including Ralph E. Powe Junior Faculty Enhancement Award by Oak Ridge Associated Universities (2015), Air Force Office of Scientific Research Young Investigator (2016), and selected Early Career Investigator Speaker in Biological Chemistry Division by American Chemical Society (August, 2017).