Heidi Koenig
PhD Dissertation Defense
Chemistry & Biochemistry
Montana State University

Friday, April 5, 2024, 3:10pm
Chemistry & Biochemistry Bldg, Byker Auditorium

“Synthesis and biological evaluation of novel antimicrobial agents for the control and eradication of pathogenic biofilms”

Abstract: Multi-drug resistant (MDR) bacteria that possess the propensity to form biofilms have presented considerable challenges for the medical field in the treatment of chronic infections. Structure activity relationship (SAR) studies were conducted on novel 2-amino-5-nitrothiazole (ANT) derived antimicrobial agents against Staphylococcus epidermidis (ATCC 35984) and Pseudomonas aeruginosa (PAO1) via Minimum Inhibitory Concentration (MIC) assays and Minimum Biofilm Eradication Concentration (MBEC) assays, and the conclusions of these studies will be presented. In addition, N-trimethylsilyl-2-amino-5-nitrothiazole (N-TMS-ANT) was synthesized as a novel and highly efficient reagent for the direct synthesis of ANT derived antimicrobial agents. The preparative utility of this reagent will be described. Additionally, poly-substituted 2-aminoimidazoles have been shown to inhibit biofilm formation, disperse pre-formed biofilms and resensitize MDR bacterial strains to antibiotic treatment. Novel disubstituted 2-aminoimidazoles have been synthesized in excellent yields via an optimized route. Anti-biofilm results of these novel adjuvants against Methicillin-resistant Staphylococcus aureus (MRSA USA300 LAC) and a highly virulent strain of Pseudomonas aeruginosa (PA14) in Kirby-Bauer Disk Diffusion assays will be disclosed. Finally, the CDC Biofilm Reactor assay, a robust biofilm model, was utilized to further shed light on the activity of our lead adjuvants against MDR bacterial strains.

Tom Livinghouse, Advisor
Philip Stewart, Co-Advisor