Toxin-Antitoxin systems:
We are intrigued by these little genetic loci - why are they there? What can they do? How do they (or, do they?) affect the course of a bacterial infection?

Methods include: Recombinant protein expression, characterization and structure determination
Functional studies using microbiology and molecular Genetics
Enzyme inhibition assays ($IC_{50}$)
Protein-ligand binding assays ($K_D$)

Fragment-based approach to folate pathway inhibitors:
We have this crazy idea about polypharmacology and the similarity between protein binding sites within a metabolic pathway. Could they be targeted simultaneously?

Methods include: Cloning and recombinant protein expression
Crystallization with chemical fragments
Analysis and correlation of binding preferences

Development of inhibitors of dihydrofolate reductase:
This is an established project and is carried out with OSU collaborators to improved antibacterial compounds

Methods include: Recombinant protein expression and crystallization with inhibitor compounds
Enzyme inhibition assays ($IC_{50}$)
Bacterial growth inhibition assays (MIC)
Protein-ligand binding assays ($K_D$)

Phenotypic screening:
This is a fancy way of say growing bacteria and looking for inhibitors. We also looks at the resulting morphology to establish if a bacterial stress response was triggered by the inhibitor.

Methods include: Microbiology, biochemistry