ENGINEERING FLAVIN DEPENDENT ENZYMES FOR STRUCTURAL STUDIES. Kaleigh Ballagh & Pablo Sobrado. Va. Polytechnic Inst. & State Univ. Flavin-dependent monooxygenases (FMO) are known to catalyze several biological redox reactions. Oxime-forming molecules have been used in the synthesis of antimicrobial, anticancer, and immunosuppressive compounds. *Streptomyces*, a common bacteria found in soil, produces flavin-dependent enzymes that have been shown to catalyze oxime-forming reactions. PcxL, found in *Streptomyces* species NRRL S-481, catalyzes the synthesis of 2-aminoethylphosphonate to 1-hydroxy-2-aminoethylphosphonate. In its wild type form, PcxL is unstable and is difficult to do activity assays on and to crystalize. This instability could be due to intrinsically disordered regions found in the C-terminus region. In this study, we designed primer and performed PCR to remove this region. After expression and purification, PcxL∆726-744 was assayed using the oxygraph, which measures the rate of oxygen consumption during reactions. Using the oxygraph, we were able to determine favorable conditions for PcxL∆726-744 kinetics and stability. It was found that PcxL∆726-744 was more active when stored and assayed in phosphate buffer, but was more stable when stored in tris buffer. The next steps in the analysis of PcxL∆726-744 is to further purify using size exclusion chromatography and to crystallize the protein for structural analysis. Funding was granted by Fralin Life Sciences and the National Science Foundation. Author contact: Kaleigh Ballagh, bkaleigh@vt.edu