Kelly Sullivan

“I want to do something that helps people, and researching new antibiotic targets is a step in that direction.” —Kelly Sullivan, Ph.D. candidate, Department of Biochemistry

THE STUDENT: Kelly Sullivan, a native of Binghamton, N.Y., once anticipated a career in graphic design launched from her father’s commercial printing company. But she also liked science, perhaps influenced by attending “Fossil Days” at the local community college where her mother taught geology, physics and meteorology. At Cornell University, Sullivan thrived in her chemistry and biology courses and “discovered I have a knack for it,” she says. On her way to a degree in molecular and cell biology, she worked as a field assistant in Kenya, where she was struck by the importance of treating infectious diseases: “I saw people struggling with diseases that we just don’t worry about here. It was very impactful.” Recent reports from the Centers for Disease Control and World Health Organization both cite an urgent need to develop new antibiotics, she adds. Sullivan aspired to develop her passion for treating microbial diseases at one of the nation’s top graduate programs. She chose Purdue, both for its academic quality and its proximity to family in Chicago, and came to West Lafayette in 2009.

THE RESEARCH: Many antimicrobial drugs operate by targeting a specific enzyme within the pathogen. The goal is to pinpoint the enzyme of interest with as little off-target effects as possible; this need for specificity is where studying and understanding enzyme mechanism plays an important role, Sullivan explains. Under the guidance of Assistant Professor of Biochemistry Joe Kappock, Sullivan is studying the purine biosynthesis enzyme, PurE. Specifically she uses structural biology and biochemical analysis to compare two classes of PurEs—class I (PurE1) in microbes and class II (PurE2) in animals. Previous research has shown that PurE is an Achilles heel for diverse pathogenic bacteria. PurE1 is a promising antibiotic target that has the fewest off-target effects.

FREE REIN: Sullivan credits Kappock for encouraging her to think creatively and to seek help from other departments university-wide as her curiosity demands. “If there’s something I want to explore, my boss is totally supportive,” she says. “If there’s a problem and I want to solve it, there’s no technique that’s off the table.”

AWARD WINNER: Sullivan received her department’s 2014 A.K. Balls Award, given annually to an outstanding graduate student who exhibits unusual potential for significant contributions to biochemical research. She also received a Bilsland Dissertation Fellowship, which supports her in this final year of completing her doctoral degree. “Right now, funding is not the best for the sciences,” she says. “A lot of us in our department have to TA (earn a stipend as a teaching assistant). This fellowship allows me to concentrate on writing my dissertation. It’s pretty amazing.”

NEXT STEPS: Sullivan is working toward a May 2015 graduation. A postdoctoral position is likely her next step toward working in an industry setting that will allow her to contribute to the development of new antibiotics. In her spare time, she enjoys travel and the outdoors, a legacy of the mountain hiking trails near where she grew up.