Stevenson Fund Report – Janet Jie-Ying Peet

Research Experience at the Departments of Biology and Chemistry, Massachusetts Institute of Technology (MIT) - June 2017-September 2017

Thanks to the Stevenson Fund Imperial, I was able to work in the Imperiali lab at MIT under the direct supervision of Professor Barbara Imperiali.

Professor Imperiali is the Class of 1922 Professor of Biology and Professor of Chemistry at the Massachusetts Institute of Technology. Her group's research focuses on the development of tools for the study of complex biological systems and the enzyme-catalysed protein glycosylation mechanism. Recently, the discovery of protein glycosylation in bacterial pathogens has inspired research that focuses on understanding the role of cell surface carbohydrates in infection as well as new approaches for understanding the molecular logic of protein glycosylation pathways and processes.

My project lasted for 3 months and was integrated into my MRes (Catalysis: Chemistry and Engineering) research project. My goal was to use organic synthetic techniques to synthesise a uridine based small molecule inhibitor for PGT (phosphoglycosyl transferase).

This membrane bound enzyme is responsible for catalyzing the first step in a glycosylation pathway that results in the creation of bacterial cell signaling proteins. The spread of the pervasive gastroentero pathogen, C. jejuni (which effects over 7 million people in the world) is a result of this enzyme's mechanism. By designing and synthesising inhibitors for this PGT, it is possible to shut down the whole bacterial cell and thus prevent this deadly pathogen from spreading.

During the project I honed my skills in Flash column chromatography, use of LCMS and HPLC. I also learnt solid phase synthesis and biochemical assay techniques (UMP-Glo and UDP-Glo) to test the activity of my newly synthesized inhibitor. I managed to finish my project having synthesised a successful inhibitor (in 8 steps) for the bacterial PGT (IC_{50} = 6.25 μM).

I was warmly welcomed by all members of the Imperiali Lab, which is comprised of undergrads, grad students and postdocs from purely synthetic chemists to hardcore biochemists! I was therefore able to observe and learn a large range of skills from a wide variety of disciplines. The atmosphere at MIT was absolutely fantastic, there was a real sense of community spirit which goes hand in hand with the cutting edge research being carried out there.