Microwave Assisted Gold(I)-Catalyzed Rearrangement of N-Propargyloxypyrindines

The goal of my summer research was to continue optimizing the title reaction that has been a focus of the Anderson laboratory over the past several years. Our interest in this reaction stems from the pharmacological potential of the resulting compounds. One challenge in this system is to selectively form one of three unique products produced by the rearrangement. Initial conditions, using gold chloride, resulted in low yields of the desired product. By changing the gold(I) catalyst, higher yields of the desired product could be achieved (72%). My work this summer focused on further optimization of the reaction conditions and isolation of the desired product in high yield.

My project required me to make starting material using standard bench-top techniques. However, the rearrangement reaction utilizes air-sensitive reagents and thus needs to be set up in an inert atmosphere glove box that maintains an argon atmosphere and contains no air or water. It was important to add precise amounts of reactants, the ratios of which could be varied, along with other conditions such as temperature and time, to optimize the reaction. Each reaction was capped inside the glove box before removal to keep air out and then run by heating in the microwave reactor, which is capable of heating the vial for a set time and temperature under pressure. After heating, the product was then analyzed by H\textsuperscript{1} NMR and purified by column chromatography.

Currently, the reaction has been optimized to yield 83% of our desired product in a ratio of 4.8 to undesired products. Difficulty has arisen in isolating this product in high yield. To date, we have only been able to recover 72% of the pure product. We aim to continue optimizing the reaction for higher selectivity and developing a better process for purification without product loss.

Research this summer was a fantastic opportunity for me to develop my skills in the lab. This gave me much more confidence and a better understanding of instruments and materials that are used in the field. I’ve also made important connections with faculty and other student researchers, along with developing a better understanding of my potential career goals. I feel quite fortunate to have been given the opportunity to do research as an undergraduate, as many students do not get this experience before graduate school or employment.