How a research internship taught me more than just the science

Andrea Lo ’18

For the past two summers, I interned at MedImmune, Inc (the Research and Development arm of AstraZeneca). Specifically, I committed both of my summers to working at an Analytical Biochemistry department under the development of a Cardiovascular and Metabolic Disease (CVMD) drug. During those two summers, I’ve come to realize that performing research at a private industry is in many ways both very similar yet very different from working in an academic research lab.

Working at MedImmune, Inc (aka “Medi”) was similar to working in an academic lab in that the passion for science and innovation was always there. As I worked both in the open office space and in the wet lab every day, I would see lab techs, research scientists, and principle investigators collaborating and working with the same passion and goal of contributing to a potentially life-saving drug project. My mentor encouraged me to think outside of the box and provided valuable advice for tackling my research project. During my time at Medi I helped develop a kinetics assay for a drug that was undergoing the Investigative New Drug (IND) application under the FDA. Additionally, I helped characterize the oligosaccharides (sugars) on the drug—an important category of features to understand while upsaling the drug’s production. While my project dealt with currently developing drugs, we still used many biochemical assays and techniques that one would use in any other organic or biochemistry lab (i.e. mass spectrometry, normal phase chromatography, cell culture, etc.) So, in many ways my experience at Medi resonated with my experience working in a very collaborative and passionate academic research lab here at Cornell.

However, if there was one main difference I found between working in industry and working in academia, it would be that the industry taught me “real world” workplace ethics and manners. Before you say that this sounds like trivial learning outcomes, let me preface by saying that as a college student, I did not have much opportunity to understand and develop my workplace skills that I may need in the future. Ever since I entered kindergarten fourteen years ago, I have constantly been exposed to an academic setting—to a point where being a student is so comfortable and everyone I interacted with knew my place as a student. However, as an intern at MedImmune, I not only worked with other college student interns and my own mentor, but also I collaborated with many experienced scientists and team leaders on my project. It was my first time in a non-academic workplace where I had to learn how to speak and act with much older, more experienced scientists who were considered my “colleagues.”

While intimidating at first, after the first month or so, walking and talking in the industrial workplace became very fluid to me. I went from wearing jeans every day in a Cornell lab to wearing pencil skirts in a high tech industrial lab. Coming in to work meant 9am-5pm hours every day—even if I didn’t need to start my experiment until 3pm. Additionally, I learned what it meant to talk to human resources, fill out a W4, receive a W2 and even now (as tax season approaches) file my tax returns. Lastly, networking became a skill I learned and needed to perfect. So, while these skills seem trivial to the working adult, it was a very transformative experience for a college student who was so unaware and unexposed to the “real world” work life. Going on from here, while I intend to pursue medicine and continue with research in the future, I am confident that learning these basic workplace skills early on as a young, incoming college sophomore will prepare me for what I might see in my future career as a physician and scientist.
Reflections on Heart Research

Derek Sung ‘16

The human heart beats 100,000 times a day, 35 million times a year, and 2.5 billion times in a lifetime. Some would say my interest in the heart borderlines on obsession, but to me it is an innate curiosity that drives my constant desire to learn more. Even during my early days in the Butcher Lab, I felt a growing desire to understand this apparently simple yet elegant organ, the mere size of a fist – the driving force in our bodies, sending blood to every artery, vessel, and capillary from the synapses in the brain to the tips of our fingers.

My interest in research began the summer after my freshman year, when I worked as a summer research fellow at Greehey Children’s Cancer Research Institute. It was here that I first discovered the wonders of biomedical sciences. Soon after returning to Cornell, I joined the Cardiovascular Developmental Bioengineering Laboratory in the Meinig School of Biomedical Engineering. Under the mentorship of Professor Jonathan Butcher, I have spent the past three years studying heart valve disease. I was lucky enough to be named a Rawlings Scholar the summer after my sophomore year for my work in the Butcher Lab. The complexity of human physiology initially overwhelmed me, but as I delved deeper into research, I developed a thrill for the hunt, happily spending endless hours in the lab running experiments in an effort to unravel and discover new disease mechanisms. It was meaningful work that I found difficult yet intriguing, a feeling that, up until that point, I had not truly experienced at Cornell.

This past summer, I had the incredible opportunity to work as a research fellow at the National Heart, Lung, and Blood Institute of the National Institutes of Health in Bethesda, Maryland with the support of my Rawlings Scholarship. I worked specifically in Laboratory of Molecular Cardiology, focusing on molecular mechanisms that are important for proper heart development. I studied Pentalogy of Cantrell, a rare disease of particular eccentricity in which the heart grows outside the chest among other abnormalities. While at the NIH, I simultaneously shadowed in the Cardiology Clinic. The feeling of walking from my experiments on heart disease to seeing patients in the clinic two floors up who would be impacted by this research was something quite indescribable and was a driving force in my decision to apply to combined MD/PhD programs. It was here that I really got a sense of what physicians and researchers meant by “bench to bedside.”

Through my work, I have been fortunate enough to be a co-author on two publications. Additionally, I am currently pursuing an honors thesis in the Division of Nutritional Sciences for my work with Dr. Butcher and have a first-author manuscript under review at Arteriosclerosis, Thrombosis, and Vascular Biology, a peer-reviewed journal of the American Heart Association. I will be applying to MD/PhD programs in the coming months in hopes to further explore the intersection of research and medicine. Next year, I will be returning to the Laboratory of Molecular Cardiology at the National Institutes of Health to continue my research on heart development. My glimpse into the clinical and research world taught me that a heart can be broken literally and figuratively, but that physicians and researchers must try to heal them all the same. Medicine and research are more than just science and application of knowledge – they are about the human connections we form at times of vulnerability. To me and to these patients, the heart is not simply a vital organ; they equate the heart with love, with identity – a symbol of who we truly are at the core, a home for the soul.
A Reflection on my Undergraduate Research Experience

Will Gregg ‘16

As I experience my last semester at Cornell and graduation looms closer with each passing day, I often find myself reflecting on the last four years. Of the many experiences that have defined my time at Cornell, my undergraduate research in the Cornell Energy Institute has been particularly significant and formative.

While writing my application to Cornell as a prospective Chemical Engineering major, I scoured the department website for lab groups and research projects pertinent to my interest in sustainable energy. In doing so, I happened upon the faculty bio for Professor Jefferson Tester. His research interests in the analysis of geothermal and other sustainable energy systems piqued my interest, and I made sure to mention it in my application essay. By a lucky coincidence, one of my peer advisors assigned by the College of Engineering during my freshman year happened to have worked in his lab and introduced me to one of the graduate students. After a series of interviews with three different graduate students, I was matched with Mitchell Ishmael as a mentor, and I have been working with him since the second semester of my freshman year.

When I first joined the lab, I encountered a steep learning curve. We were using a flow calorimeter to determine the heat capacity of supercritical fluids, and I lacked a background in many of the thermodynamics, fluid mechanics, and heat transfer concepts that were integral to the project. As such, I started out small, working on simple tasks that were simultaneously useful for the project and educational for me. Looking back, it is amazing to think of how much I’ve learned. Over the last four years, my work has encompassed experiments in the laboratory, literature review, data analysis, computational modeling, and, most recently, academic writing. I’ve found that this applied experience fills the gaps between the theoretical chemical engineering curriculum and the real world, and my overall education would have suffered significantly without it.

One of the major milestones of my undergraduate research experience was being admitted to the Hunter R. Rawlings III Cornell Presidential Research Scholars (RCPRS) program in the summer of 2014. RCPRS has provided me with great resources, financial and otherwise, to further my research goals. For example, last semester I used my research support account to pay for the new user training program for the Cornell NanoScale Science and Technology Facility (CNF). As a result, I am able to use a highly precise, programmable cutting laser for my experiment. Besides equipping me to accomplish my research objectives, RCPRS as a community has been a source of great friends whom I might not have otherwise met.

Looking forward, even though I will not be pursuing a further course of study in Chemical Engineering after graduating, the skills and knowledge that I developed as an undergraduate researcher will prove invaluable in my career. My last four years at Cornell have been by far the most formative of my life, and I will always be grateful for the role that research played in my broader undergraduate experience.
“Easy,” I thought, as I looked down at the last item on the list. I was just one name away from completing the scavenger hunt and winning a prize at the RCPRS Freshman Colloquium. All I had to do was find someone who could wiggle all 10 toes at once. Admittedly, this should not have been a difficult task. Any random person would have likely been able to do it, but as with any good icebreaker, the hardest part was breaking the ice. I’d used up all the easy targets – my friends, people I’d talked to around campus, myself – and now I was forced to actually meet someone. I looked around the room, wiggled my toes in my shoes just to confirm it was really as easy as I imagined, and just as I was about to approach someone to finish the game, I heard Kristin’s voice on the microphone: “Alright everyone, we have a winner!” Oops.

Looking back, I still regret that moment. It’s not because I didn’t win the prize (it was probably a leftover XL RCPRS T-shirt that no one claimed), but because I didn’t make more of an effort to get to know my fellow Rawlings Scholars. I know now that my colleagues in the program are a truly exceptional group of students with a contagious passion and dedication. I’ve listened to stories about their time abroad in Africa and Costa Rica, congratulated them as they received renowned scholarships, and learned from them more about fruit fly intercourse than I wanted or needed to know. In the process, I became aware that Rawlings Scholars, whether in Hotel, ILR, or Engineering, all have one thing in common: we love what we do.

RCPRS has allowed me to conduct research since my freshman year, including three summers of research in Ithaca and across the country, and the experiences have informed my decision to pursue a Ph.D. at UC Berkeley. I’m excited to continue developing my passion for research, but it’s a bittersweet feeling knowing that I’ll be leaving my colleagues and friends. However, I’m sure that no matter where my path leads, another Rawlings Scholar will cross it. RCPRS students are worldly people who follow their passions to all edges of the globe, and it’s just a matter of time before I bump into them again. I’ll miss Cornell and the friends I’ve made here, but it’s comforting to know that May will not be so much a “good bye” as a “see you later.”

**Closing Thoughts**

Eric McShane ’16

**Upcoming RCPRS Events**

**Senior Expo** April 21, 5-6:30 PM: Come see the amazing research our RCPRS seniors have accomplished during their years at Cornell! Complimentary catered food and refreshments from Ithaca Bakery will be provided.

**Coffee Tab** April 25, 6:30-8:30 PM: Come socialize with other RCPRS students at Libe Café in Olin Library with coffee or tea on us!

**Pizza at the Nines!** TBD: Celebrate the end of the year with free pizza at the Nines with other RCPRSers

**Dairy Bar Social** May 16, 4:30-6 PM: Take a study break and get some free ice cream at the Dairy Bar with other RCPRS students

Keep up with RCPRS-SAB events on FB!

https://www.facebook.com/groups/cornellRCPRS/