Final Reflection on
My 2016 Summer Research Experience
at Brown University

Rea Yoh

This summer, I was given the opportunity to attend Brown University’s Summer@Brown Pre-College Program in Providence, Rhode Island, for three weeks. From June 20th until July 8th, I assumed the role of a college student, taking the course “Stem Cell Biology and Regenerative Medicine,” which was taught by Dr. Lindsay Mehrmanesh (Dr. M.) and her teaching assistants (TAs), Adeola Adebayo and Anna Petrashe.

Understanding the Science

In one word, Summer@Brown can be described as “rigorous,” and the participants seemed to all be more than qualified for such a strenuous program. The people I met opened my eyes to the great talent and motivation that exists beyond Carbondale’s borders. Although my class included people who had never taken a biology course in school, everybody worked at the same high level and fast pace because of their willingness to learn.

Dr. M. and her TAs understood the importance of well-rounded teaching. Presented to us were videos on the unmatched regenerative capabilities of planaria, clarifications on the previous night’s homework, and lectures on the different potencies of stem cells. Dr. M. engaged the class by creating a class filled with energy and passion. After an exposition on the topic that we were studying, we were sent upstairs to the laboratory. Because Dr. M. wanted all of us to be familiar with working with cell cultures, she established lab protocols based on common microbiological techniques. We learned to transfer plasmids through lipid-based transfection, culture cells using the hanging drop technique, and trypsinize cells. Trypsinize. Learning the spelling was more difficult than learning the actual process!

All of these procedures were completely foreign to me, as I had never worked with cells before; learning them made the stem cell-specific experiments easier. By the end of the course, I created a petri dish of microscopic neurons. It was unbelievable to watch the glowing life of my own creation. Once simple, unspecialized embryonic balls, they had evolved into widely-branching nets of nerve cells. “My children,” I called them.

These “children” were, in fact, the culmination of a series of hands-on experiments. By harvesting cells from the strangest of places, like the brain tumor of an unborn mouse, or by
feeding the cells different amounts of unappetizing-sounding media, like fetal bovine serum, we discovered the variety of ways that we could turn stem cells into somatic (body) cells.

A shift from the analytical side were the in-class discussions. The existence of stem cells in the laboratory is a harbor of controversy, we quickly learned. I previously assumed the largest ethical issue to be the harvesting embryonic stem cells, but I then learned of stem cell tourism and unmonitored stem cell clinics. Suddenly, regenerative medicine was a potentially risky field with frighteningly few limits. This newfound knowledge allowed us to give presentations on various aspects of regenerative medicine, such as the advancements of stem cells in the treatment of particular diseases or organ systems.

However interesting the subject and the teaching were, the course itself was still very difficult—we were given three weeks to complete a course that a university student would complete in a semester. Because of this, we were loaded up with huge amounts of challenging homework every night, which typically required three or more hours to complete. As a result, after class, I encountered a new challenge—learning how to manage my time.

**Life Outside of the Classroom**

Providence is a beautiful city. The Protestant culture that founded the city is still alive everywhere, from the steepled churches to the charming, shingled houses. However, I had to balance exploring with homework. The dormitories required an 11 p.m. check-in, which allowed ample time for a few evening strolls, but I always needed to make sure that I settled down to work. Given that I was involved in fascinating studies, my work ethic no longer required me to force myself to get assignments done in as little time as possible. Instead, I spent hours and hours researching past experiments on recombinant DNA, listening to podcasts on stem cells, and watching videos on CRISPR. I genuinely wanted to put in as much effort as possible when answering the questions assigned to us. And any problems I encountered were quickly solved with an email to Dr. M. or her TAs.

When I first arrived at Brown, I found myself in a completely unfamiliar environment. I assumed that the only greetings I would receive would be “how many AP classes are you taking next year?” or “what is your class rank?” This was true to a degree. Here, however, lies the beauty of a school in a metropolitan area. I had the ability to find a healthy community of compassionate, inspired people. I was in a city filled with people who held different views and beliefs, and there were bound to be those with whom I could connect. Providence beckoned me, and I could not resist its call.

Although Providence’s atmosphere contained the underlying energy found in most cities, it was not overwhelming. Pedestrians buzzed about the streets at every hour, and I quickly became one
of them. Sparkling with culture and life, the city did not disappoint. Tourists and residents alike flocked to the pillars of the city: the historical monuments and the artists’ hubs. The streets were lined with quaint, little shops, owned by virtuosos proudly displaying their creations. Beside those shops were regal, columned buildings, their materials and architecture an homage to times long past. Taking sunset walks past these structures to Prospect Park, which provided a stunning view of the entirety of Providence, was extraordinarily romantic. I became charged with an unfamiliar, unflagging enthusiasm; no longer was I nervous about taking control of my own life. I could go wherever I pleased at any time I wanted.

Even more important than the amazing places I explored were the unforgettable people I met. Having only limited interactions with people outside of southern Illinois, I was unsure about what to expect from the people on campus. I learned that I had no reason to be nervous when I met my group of friends, people who were refreshingly different from those I had grown up around and spent my entire life with in Carbondale. Every conversation they started was alight with dazzlingly genuine passion. Speaking with grace and conviction, they understood the importance in wholeheartedly loving and pursuing their interests. One friend would express his desire to be a lexicographer, rattling off everything he knew about linguistics; another would regularly cite philosophers for the sake of debate. However, my appreciation for them did not just extend to their intellect and fanaticism; whenever they made plans to visit a cafe or restaurant, they always made sure to invite me. I felt warmly welcome, and I completely admired them.

**Looking Back with Steps Forward**

Without any exaggeration, I can say that I knew nothing more about stem cells than simply the existence of their controversy before taking this course. Rather than being the glorified “miracle cure” that many sources claim them to be, stem cells are very fussy. If anything is slightly unbalanced, such as the chemicals, the result could be a monstrous, hair-covered, tooth-growing tumor. Such dangers are sobering, but they do not detract from the value I see in pursuing regenerative medicine.

Without researchers, there would be no way past these hazards. Without trained, knowledgeable doctors, there would be less credibility for the field of regenerative medicine as a whole. Without bioethicists, there would be no one to inform the public about the precautions and dangers associated with the field.

On a more positive note, the possibilities of stem cells improving the lives of patients is nearly infinite. Growing organs and allowing paraplegics to walk on their own again once seemed like the purview of science fiction, but it is now within humanity’s grasp. My passion for
regenerative medicine was once only marginal, but I am now confident in choosing such an important career.

Not only were my eyes opened to the possibilities of stem cells and regenerative medicine, simply living on campus showed me the importance of taking initiative. I was not bound by distance, time, or motivation to do what I wanted. Numerous opportunities—exploring downtown, visiting eateries in the area, seeing parks and monuments—were within my reach, and I had pursued nearly all of them on my own. The city was large and unfamiliar, but after I had gone through it numerous times, it was no longer a mysterious, daunting beast. I conquered it, and it is now a familiar friend. I know I will return to it.