Final Reflection on My Time at the BU Research in Science and Engineering Program 26’

By Francis Bu

The Boston University Research in Science and Engineering program is a highly esteemed summer research program for rising seniors. The program provides a platform for academically driven students to collaborate and pursue their passions in a meaningful way. This summer, I studied computational neurobiology alongside 53 of the brightest individuals in the nation. My final project modeled a “GLIF3-PING Framework for Characterizing Breakpoint Dynamics in Gamma Synchronization During Progressive PV+ Interneuron Silencing.”

Why BU RISE?

Boston is one of the nation’s leading centers for research and development. Between BU, Northeastern, Boston College, Harvard, and MIT, the city is filled with students and researchers striving to make a difference. For over 45 years, the RISE program has helped prepare hundreds of students to attend T-20 universities and pursue careers in STEM. However, its success comes not only from its 3.9% acceptance rate and national recognition, but also from the challenging and supportive environment it provides for its attendees. Before applying, I had never heard of RISE. I only discovered it after Googling “best summer research programs for high school students,” and I am extremely happy that I did. When deciding between RIBS at UChicago and RISE at BU, I ultimately chose RISE because of its rigor, six-week duration, and more intensive combination of lectures, laboratory work, computational modeling, and research.

Academic Experience

Undeniably, larger, wealthier, and more developed regions tend to offer more opportunities. Comparing a 900-student school like Carbondale Community High School to a 4,000-student school like Round Rock High School is hardly fair. Luckily, the GFF provides students like me with the support necessary to access opportunities like RISE. At RISE, I met some of the smartest people I have ever encountered. Everyone was conventionally book-smart and academically gifted, yet they were also socially active and, for lack of a better word, “normal.” Sure, they were nerds, but who am I to talk? At RISE, I studied computational neurobiology. The program’s goal was to take a deep dive into the growing field of neuroscience while learning how computational modeling can be used to study the brain and address real-world problems. The program was divided into morning lectures and afternoon laboratory sessions. Throughout all six weeks, our morning class ran from 9:30 to 11:30 a.m. The lectures gradually transitioned from the general foundations of neuroscience to more specialized topics ranging from sleep and memory to neuropsychiatric disorders. For the first three weeks, our afternoon sessions consisted of wet labs from 1:00 to 4:00 PM. By working with crickets, earthworms, and fruit flies, we

studied action potentials and neural circuits in relatively simple organisms, giving us a better understanding of how our own nervous systems function. During the final three weeks, the afternoon sessions shifted to a computational lab. After learning the fundamentals of coding and computational neural networks—including how to code leaky integrate-and-fire neurons—we separated into groups and developed our own research projects. After much deliberation, my group chose to develop a generalized leaky integrate-and-fire neural network based on a pyramidal-interneuron network gamma (PING) model of a mouse cortical network. Through this model, we investigated how the loss of parvalbumin-positive interneurons might weaken gamma oscillations and contribute to patterns of compromised neural activity associated with schizophrenia. From conducting background research and writing our abstract to integrating datasets into our model's code, the entire experience was truly a blessing. Without the GFF, I would never have had access to an opportunity like this. The exposure to the research process and the networking opportunities provided by RISE were truly remarkable. Moving forward, my group plans to submit our project to the MIT Undergraduate Research Technology Conference this fall and, hopefully, present our findings once more.

Social Experience

A major concern I had heading into the program was that everyone would be extremely nerdy and antisocial. I am generally a very extroverted and social person, so my friends and social life are extremely important to me. I worried that many students would be so hyperfocused on academics that they would neither have nor value much of a social life. However, I am happy to report that I was wrong—so wrong. The people I met at RISE were some of the most relatable, funny, and personable individuals I have ever encountered. It was nice knowing that we were all smart, but we did not have to talk about it. In fact, we rarely discussed academics. Everyone knew that if you had been accepted into RISE, you were capable, so there was no need to prove it. Many of us had also faced similar academic pressures and expectations, allowing us to relate without having to explain ourselves. Like me, everyone I met at the program was driven and goal-oriented, which is something I greatly value. At the same time, each person brought unique talents, strengths, and perspectives that broadened my own way of thinking. It was especially interesting to learn how different school systems operated across the country and even internationally. From taking late-night trips to Newbury Street for food or shopping to screaming our hearts out at karaoke, I enjoyed every moment of the program. Truly, the lessons I learned, the experiences I had, and the connections I formed at RISE will remain with me for years to come and influence the person I become. Perhaps my greatest nonacademic takeaway is that no matter where you go, you will find your people.

Future Plans

Over the past three years, the continued support of the GFF has allowed me to study Surface Chemistry at the University of Michigan, neuroscience at Washington University in St. Louis, and participate in the Research in Science and Engineering program at Boston University. During the summer of 2024, as I prepared to enter my sophomore year, I felt lost. Sure, I was conventionally smart, but I lacked a clear passion or direction. Over time, however, my personal experiences and programs sponsored by the GFF have broadened my perspective while narrowing my focus, helping me develop a better understanding of what I would like to do in the future. If it is not obvious already, I am extremely passionate about STEM, particularly neuroscience, biology, and chemistry. Although research itself is not necessarily where my passion lies, these experiences have taught me about its importance and implications while giving me a much greater appreciation for the work researchers do. Personally, I would rather work on the human side of medicine, where I can apply my knowledge while using my social skills to connect with and care for others. Moving forward, I plan to make the most of the time and money the GFF has poured into me by making a meaningful contribution to society. My ultimate goal is to study either biology or neuroscience in college while following the pre-med track and eventually becoming a doctor. What kind of doctor? I am not sure yet, but I know I will figure it out. Ultimately, I want to make a difference by providing patients with the treatment and care they need to continue enjoying their lives with the people they love.

Final Remarks

Once again, I would like to extend my deepest gratitude to the Garwin Family Foundation. Without the support and network provided by this foundation, I would never have had the opportunity to attend these amazing summer programs over the past three years. At RISE, nearly everyone I spoke with told me that their families had paid for the program out of pocket. Without the GFF, participating in an experience like this would not have been possible for me. Above all else, the staff and mission of the GFF are truly commendable and unique. I believe I speak for all current GFF sponsees and alumni when I say that the foundation’s work is remarkable and leaves a lasting impact on each of us. Moving forward, I can only hope to make the GFF, my family, and my community proud by continuing my pursuit of excellence and contributing meaningfully to society. I am immensely grateful for the connections I have formed, the lessons I have learned, and the opportunities I have received because of the GFF.