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Host Lab in Japan: Madoka Takai, The University of Tokyo, Department of Bioengineering

Meaning of Nakatani RIES Fellowship: How would you describe the meaning/impact of the Nakatani RIES Fellowship

The Nakatani Research and International Experience for Students Fellowship Program (RIES) holds profound significance for aspiring researchers and engineers, serving as a gateway to a world of global opportunities and experiences. The fellowship is not only a program but also a transformative journey for undergraduate STEM students, including myself. It enabled me to dive into cutting-edge research at the University of Tokyo, under the guidance of professor Madoka Takai and mentor Mkliwa Koumbia. The fellowship gave me and the other US fellows the ability to forge connections with lab members, professors, and Japanese locals, and relationships that will be fostered far beyond the laboratory. Over the course of a few months, this immersive global research internship program wove together cross-cultural learning, the exchange of knowledge, and the formation of new friendships and partnerships that I am forever grateful for.

Research Internship Overview: Provide a description of your research project and experience during your research internship. How did your project relate to your current or future academic interests? What was the experience of working in international research setting like? What will you take away from your research experience this summer and what impact do you think this has had or will have on your future academic career or research interests?

I performed research that endeavored to enhance the sensitivity of biomolecule detection in the hopes to enable early disease detection and prevention. More specifically, I focused on developing a biosensor targeting antibody immobilization to monitor cortisol levels, cortisol being an essential hormone in the body responsible for stress responses and overall health. This relates to my current interests involving research towards the prevention or even a possible cure for Alzheimer's disease (AD). Antibody immobilization can be used as a technique to capture AD-related proteins or biomolecules such as A β (1-42) from biological samples like blood or cerebrospinal fluid.

The research and lab skills I learned while at the University of Tokyo increased my knowledge of electrochemical biosensors and the role they can play in the understanding of complex neurodegenerative diseases and the development of potential diagnostic and therapeutic strategies. Working in an international research setting was inspiring as it showed me the countless ways in which my degree and field of study can be applied. Being able to meet other international lab members showed me how vast the scope of research can be with collaboration and teamwork. It was interesting to participate in the lab discussions and see how fruitful research can be when the environment welcomes and is open to questions and different approaches to the same topic. Moving forward, this research experience has equipped me with more skills needed for my major and challenged me in my creative problem solving where I will be more prepared and able in future contexts.

Lab Environment Overview: Provide an overview of what the personal environment of the lab was like. Describe the personality and working style of your research group? What was it like working with your research mentor/s and the overall group dynamic in the lab?

The personal environment of my lab was welcoming and family-like. In Japan, the work-life balance is different compared to the United States, and staying late in lab or working over hours is not abnormal. However, despite this norm, the lab members made the lab feel like a home as everyone worked well with and supported one another. This made it easy to be comfortable working with international team members, which in turn allowed the research to be more effective and productive. Working with my research mentor was an incredible experience as I was given constant support and thorough guidance while conducting my experiments. He showed expertise in his field and took the time to be extremely in-depth and methodical in each step of the process. He was also open to new ideas from my part and passionate not only about teaching but about learning with me over the summer. The other lab members that I spent time with were excited for my learning and research there as well. They demonstrated an admirable work ethic and an inviting feeling in the lab that I whole-heartedly appreciate.

Daily Life in Japan: Provide an overview of what your daily life was like in Japan. This could include the people you interacted with outside the lab on a day-to-day basis, food, your housing/living experience, your travels around Japan and the challenges you faced and the rewarding experiences you encountered over the course of the summer.

When it comes to my daily life in Japan, I was consistently greeted and welcomed every place I traveled to. During the weekdays, I would take the train and walk to the University of Tokyo and eat lunch at the cafeteria with the other students. After lab hours, I would venture around the university campus or visit Tokyo Dome City Mall to find a new place for dinner. Having a limitless level of independence allowed me to be resourceful and manage my schedule on my own time. I was also fortunate to have one of the US fellows as a roommate who also performed research at the University of Tokyo, so we would spend most of our weekdays roaming around and researching new places and areas to visit, and on the weekends, we would travel to different cities throughout Japan. We became extremely resourceful with using our transportation and making sure we had an efficient itinerary. In general, it was very easy to adapt to the lifestyle in Japan, and I found many things to be more convenient, effective, and simpler there. The locals were inviting, and we were given many helpful suggestions and recommendations from our fellow lab members. Thus, we were more than comfortable living in a different country and communicating with people there despite the language barrier. Locals were patient and kind, so we were more eager to step out of our comfort zone and try new things.

Experiences with Japanese Culture: Provide an overview of your most meaningful experiences with Japanese culture. This could be program activities or interactions you had with your lab or within your daily life in Japan that you think best exemplify aspects of Japanese culture or values. What did the experience/s teach you about Japan? What did they teach you about yourself?

With my lab members, when we went out to have lunch or lab dinner, it was a lively and happy environment that allowed me to get to know everyone well. They taught me things about the Japanese culture and asked about my experiences so far. This made the time I spent in Tokyo very authentic and memorable. I also got to do other activities with the Nakatani fellows from this year and the alumni from last year. This included making and decorating furin (Japanese wind chimes), visiting Mikimoto Pearl Island and watching the ama 'women divers' around Toba, walking around Chikubu Island and learning about the sacredness of the island, having a tatami dinner on a yakatabune in Tokyo, and more.

What made all these experiences even more meaningful and cherished was the company

that was there. I was able to share all these memories with both the US and JP fellows, learning from each person along the way and building several friendships with people I have been so blessed to meet. Being able to have these personal connections in addition to visiting these places and trying new foods, gave me extra insights into Japanese traditions and culture that I would not have been exposed to otherwise. I learned that Japan is a country rich in history and full of diverse opportunities. Every place I visited and every person I met has a unique story that all combines into one beautiful adventure. This taught me more than I ever could have imagined, not only about Japan but also myself. I learned how to immerse myself into the culture and found that I was more than ready to put myself into new situations. Being with people who encouraged curiosity and who were also eager to try new things made every uncertainty even more exciting, and I am so thankful for these past few months in Japan for helping me discover more passions. Japan and the students I met there made me feel at home, even while being on the other side of the globe!