

Long-term Overseas Dispatch

Department of Chemistry and Biotechnology, 2nd year Master

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I worked with Prof. Scott Lokey, a world-leading researcher in the field of passive membrane permeation, whose research interests lie in the cell membrane permeability of peptides, at department of Chemistry and Biochemistry at the University of California-Santa Cruz (commonly known as UCSC) in Santa Cruz, near San Francisco, USA, for a month from February 21 to March 21, 2019. My study overseas dispatch was launched when Professor Lokey came to hear my poster presentation at an international conference, and I had a wonderful time during the overseas dispatch.

My research field is about the development of basic technology to improve the cell membrane permeability of peptides. As a result of our diligent efforts, we found that ester bond substitutions in the main chain of peptides improved the cell membrane permeability. Moreover, the improvement was better than that of the N-methylamide bond substitution, which has been widely used for improvement of membrane permeability of peptides. We had thought the reason of this unexpected and interesting result lied on the conformational preferences. In my laboratory, however, we lacked the know-how in computational chemistry, which made it difficult for us to investigate the conformational preferences and to take a step forward. In such a situation, my study abroad program with Prof. Lokey, who is also skilled in computational chemistry, suggested that the ester bond substitution did not change the conformation of the original peptide, and therefore, the ester bond substitution improved the membrane permeability more than the N-methylamide substitution. The data obtained in this study are now published in ChemRxiv. (ChemRxiv. Preprint. <https://doi.org/10.26434/chemrxiv.12272861.v1>)

It was also very meaningful for me to work with researchers at a laboratory that leads the world in the research of peptide membrane permeability. My laboratory is not yet world famous in terms of peptide membrane permeability, so being in a laboratory with many professionals in this field was a great opportunity to learn how researchers in this field

thought and what they were aiming for, as well as to learn about the techniques. From this viewpoint, I gained a lot from this study abroad program.

Prof. Lokey and the students in the Lokey Laboratory took me to various places, so I was able to enjoy my life in California as well as in my research. On my day off, we visited Silicon Valley in San Francisco to visit the headquarters of world-leading IT giants such as Apple and Google. Many of the people in the city have bright and positive thinking, and I found feeling this kind of culture to be one of the best parts of studying abroad.

I would like to thank Prof. Lokey and the members of Lokey Laboratory for their kindness in accepting me, Dr. Furukawa, a former researcher of Lokey Laboratory, for helping me to realize the study abroad program, the Graduate School of Engineering at the University of Tokyo for their financial support, Prof. Sando and Assistant Prof. Morimoto, now Lecturer, for their advice to make my study abroad experience more meaningful, and this study abroad program was made meaningful thanks to many people. I would like to thank all the people who have been helped me for this program.



Picture 1. Lunch with Lokey lab members.



Picture 2. A picture on the final day with Lokey lab members.