（別紙様式２）

フォトンサイエンス国際卓越大学院プログラム（XPS）
光科学特別実習　報告書

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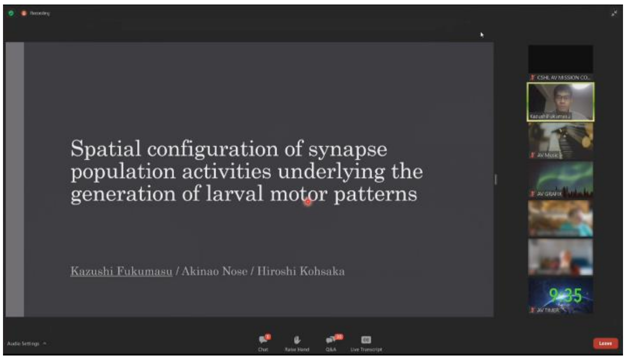
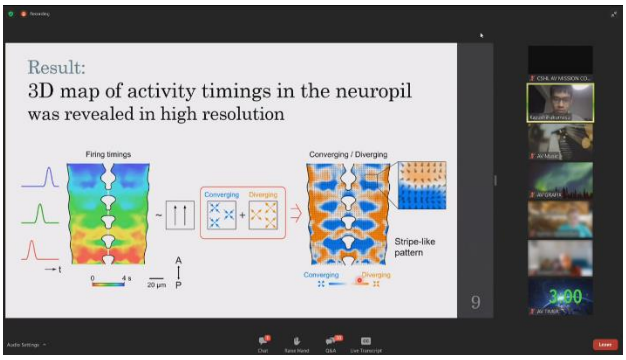
日程	西暦　2021 年　10 月　5 日　～　西暦　2021 年　10 月　8 日

Cold Spring Harbor Laboratory has a long history as an institute of biology and medical science. It was an honor for me to attend a meeting there, “Neurobiology of *Drosophila*”, and present my own research as a talker. That was an irreplaceable experience.

The meeting was taken place online for four days. We had two sessions per day, while each session was composed of ten-minute talks of distinct speakers at Zoom. We also had poster sessions, where we chose posters from a list and discuss with the presenters via Slack. For each day, meeting was held from 9:30AM to 6:00PM (EST), and that was from 10:30PM to 7:00AM in Japan. Because I had expected that attending the meeting in such time zone should be hard, I had changed the time of sleeping and coordinated the body clock beforehand. Thanks to the preparation, I could concentrate on the presentations much more comfortably than expected.

My talk was held in Session 7 “Synaptic Transmission and Plasticity” on the fourth day. I was nervous, because this was the first time for me to attend an international scientific meeting. Hundreds of attendees watched my ten-minute presentation, and I took a few questions written in the Q&A box of Zoom. The questions were read aloud by the chair person, and I answered them on the spot. From the questions, I could get feedbacks about my research, especially what is unique, what is important, and what is difficult to understand.





In the meeting, I was most impressed by diversity of the research subjects. Since *Drosophila* is the scientific name of fruit fly, it looks like “Neurobiology of *Drosophila*” is a quite specialized field at first glance. However, I realized that there are so many researchers using fruit flies to investigate nervous systems, and working on surprisingly wide variety of subjects. I reconfirmed that the traditionally developed genetic techniques made *Drosophila* an exceptional model species for biological experiments, especially for the neuroscience. The research subjects presented in the meeting ranged over development, regeneration, pathology, circuit structure, learning, and evolution, as well as experimental techniques, and almost all of them were utilizing various genetic tools. In addition, because flies show metamorphosis during developmental process, the research subjects were largely different depending on which stage they focused on, larvae, pupae, or adults. While I am working on how larval locomotion is generated in the central nervous system, I could recognize the placement of my research in such various subjects during the meeting.

In comparison with other research subjects presented in the meeting, I realized uniqueness and importance of my own research. Because the mechanism of how brains work is one of the biggest questions in the neuroscience, there were of course many subjects attempting to reveal how nervous systems process information. Information processing by nervous systems follows several steps: starting from sensory input, sensory processing, decision making, and motor processing, and then terminated by behavior output. Because it is still difficult to describe the whole process of information processing comprehensively, most studies focus on one or a part of these steps. Here, the target of my research is the circuit mechanism of motor processing. However, I noticed that there were much fewer subjects about motor processing than sensory processing or decision making. The reason might be that it is likely easier to experimentally test sensory systems than motor: experimenters can control sensory inputs that are being applied to specimens, but difficult to control motor outputs that are determined by inner states of specimens. Nevertheless, the importance of motor processing mechanism should be equivalent to sensory processing.

Another unique point of my research that I recognized during the meeting is that it attempts to reveal topographic structure of motor processing circuit. It is known that there are several topographic structures in the brain that are correlated with the structure of the environment. For example, in the visual system, neurons responsible for specific positions on the retina are continuously arranged according to the actual spatial structure of the visual field. This nature is termed as retinotopy, and other regions of the brain also show somatotopy, tonotopy, and so on. In the meeting, I found a few subjects engaged in such topography. However, they were all about the sensory system, and no subject commits to the topography of the motor circuit except mine. I felt that the topographic structure of the motor system was not intensely studied, or not even recognized. Importing knowledge about the topography in the sensory system into the motor system should accelerate comprehension of the motor processing mechanism. During the meeting, I thought that the research of mine would possibly be the pioneer of the topography in the motor circuit.

Finally, I recognized the necessity of making my study easier to understand through the meeting. Actually, my research contains many abstract concepts such as divergence of a vector field, so it is challenging to explain my study clearly. Especially, it is still unclear how such concepts are related to the previous researches about the motor processing. I would like to convince capable neuroscientists, like who I met in the meeting, of the significance of the research. Therefore, I decided to seek how to clearly explain the meaning of the abstract concepts. Also, I will conduct additional experiments to explicitly visualize positional relationships between the topographic structure that I found and previously known structures. By attending the meeting, I could see the direction in which I should make progress on my research.