

This report should be submitted within 2 weeks after you return to Japan.

(Abroad) Internship report form (Student)

2016/12/26 (Year/Month/Day)

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| Name | Paulina Duhita Anindita |
| Laboratory | Div. Molecular Pathobiology, CZC |
| Year (Grade) | D4 |
| Internship institution | Conway Institute, University College Dublin |
| Internship period | Internship period: 11/07/2016-12/07/2016 (Departure Date from Sapporo: 11/04/2016, Arrival Date in Sapporo: 12/11/2016) |
| Purpose | 1. To have a training in computational biology field as applied to the current studies in rabies and other viruses 2. To gain practical experience in the research environment of UCD to support future career as a postdoctoral research fellow 3. To gain information and seek opportunity on postdoctoral research fellow in UCD |

- The reason why you chose this institute

University College Dublin (UCD) is among the universities participated in the Global Institution for Collaborative Research and Education (GI-CoRE) in Hokkaido University (HU). Accordingly, I attended a module of “Advances in Infection Biology 2016” at UCD on March 2016 as a part of a student exchange program that is currently conducted between UCD and HU, involving the School of Veterinary Medicine and the Research Center for Zoonosis Control. Through this visit, it has come to my attention that UCD has a strength in bioinformatics and computational biology studies. One research group led by Prof. Shields in UCD has developed bioinformatics methods to predict and identify short peptides and motifs from proteins of human and viruses. It will be useful for me to learn about these bioinformatics methods which can be applied to support my study in rabies and bring an advantage in my future career as a researcher. I also hope to seek for an opportunity as a postdoctoral research fellow in UCD through this internship program.

- Result of the activity (about 800 words, provide photos, tables and figures that clearly show the activities during the period)

The internship was done entirely computer-based by learning various

computational approaches to analyze protein sequences from various rabies virus strains and related viruses, and to identify viral motifs that are involved during virus evolutionary adaptation to the host, supervised by Prof. Denis Shields and Dr. Norman Davey.

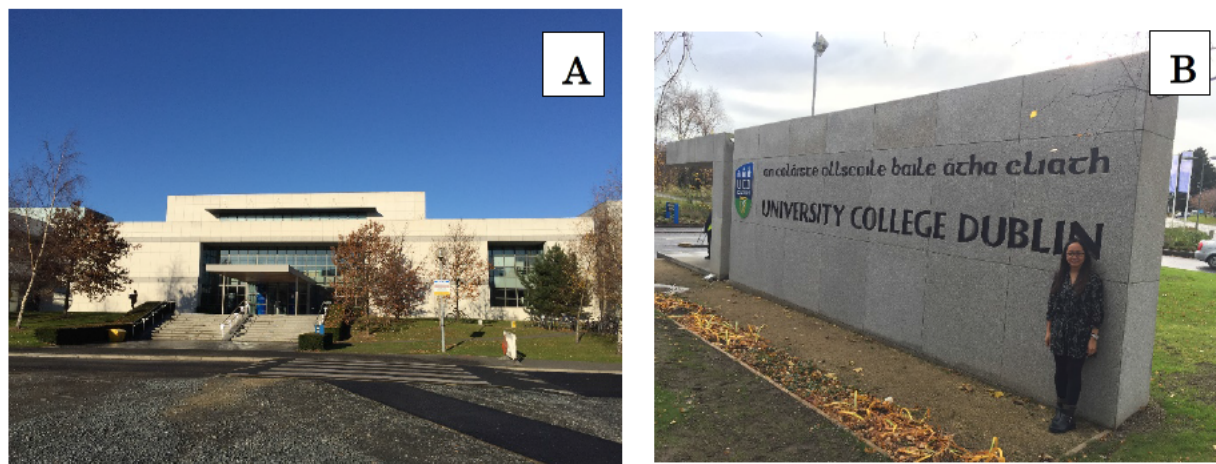


Figure 1. UCD Conway Institute (A) and the main gate of UCD (B)

The activities were started by collecting the protein sequence data of viruses belonging to the order *Mononegavirales* which include rabies virus. The data are then submitted for multiple sequence alignments (MSA) and phylogenetic analysis. Besides that, information about short linear motifs (SLiMs) that have been found and experimentally validated in virus member of *Mononegavirales* was also collected from the Eukaryotic Linear Motifs (ELM) database, referred as true positive instance. Seven SLiMs were identified and their regular expressions were used as an input to search against virus database using SLiMSearch4 that are being developed by Izabella Krystkowiak, a doctoral student of Dr. Davey. The search gave back results that included the information about viruses, viral protein in which the SLiM was found, degree of conservation etc. Using this tool, several mononegaviruses could be identified having the SLiMs. The results can be confirmed since true positive instance could be identified. The next step was to annotate the data obtained by SLiMSearch4 with protein disorder database (MobiDB) and to visualize the MSA and directly investigate the position of SLiMs in the MSA of order *Mononegavirales* by ProViz, a tool for investigating the functional and evolutionary features of proteins. Together with Prof. Shields and Dr. Davey, any results or difficulties were discussed daily during the internship. In

the day before my final day of internship, I presented all the analyses and results obtained during internship and had discussion with the members of Shields and Davey laboratory.



Figure 2. Desk work on protein data analysis (A), visualization of protein sequence alignment by ProViz (B), and presentation of results and internship activities with members of Shields and Davey laboratory (C)

Besides doing the main work, I attended student presentations every Monday. It was a good chance to know about research project of doctoral students that are working in the field of computational biology. Even though most students were working with computer-based analyses, many of them were also doing experimental works. Not only the students but also the professors joined in active discussion during the presentation. I also had a chance to attend a student-centered annual symposium, the UCD Computational & Molecular Biology Symposium 2016 on December 1 - 2, 2016 at UCD Conway Institute. This symposium was entirely organized by the first-year doctoral students. Leading researchers in the field of computational and molecular biology were invited to give a talk about their researches. There were also oral or poster presentations from doctoral students of UCD and other universities. Awards were given to students who gave best oral and poster presentation.



Figure 3. UCD Computational & Molecular Biology Symposium 2016

- What do you think the positive impact of the activity will have on your further career path?

My doctoral studies involve mainly experimental works that are done inside the laboratory with very little involvement of bioinformatics methods. In this internship, I began to be more familiar with working in the field of bioinformatics by using several different tools to analyze the protein sequence data as well as collaborating with researchers and students in UCD. This experience is particularly important for me to build my research expertise that is not only focusing in experimental subjects but is also reaching the field of bioinformatics that will support my future studies. I also learned how to think with bioinformatics perspective which is different from experimental perspective. This internship also provided an opportunity for me to meet prospective Principal Investigators (PI): Dr. Virginie Gautier (researches on HIV in the UCD Centre for Research in Infectious Diseases, CRID), Dr. Noreen Sheehy (researches on HTLV-1 and 2 in CRID), and Dr. Gerald Barry (researches on arboviral diseases in the UCD School of Veterinary Medicine). We had discussions about research in their groups and career opportunity as a postdoctoral research fellow in UCD. Furthermore, I am now familiar with research attitude and working atmosphere in UCD which has also broadened my mind. Finally, I am considering UCD as one of the institutions

where I would like to work as a postdoctoral research fellow following my career aspiration as a researcher; therefore I am now looking for a postdoctoral fellowship grant to work in UCD.

- Advice for your junior fellows

It is important to determine your career aspiration and what kind of work you would like to do as your career. Thereafter, you can start seeking the suitable place to work. Do not hesitate to learn new knowledge that is outside your current field. By having that kind of knowledge, it will help to broaden your perspective and you will have a provision to work in collaboration with researchers from different fields. When going on an internship, it is good to be a proactive person such as discussing about the content of internship with your host and seeking career opportunity by meeting and talking with researchers in your host institute/company. Furthermore, the internship can help you to dig up your potency and research interest in addition to what you have been doing during your doctoral study.

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| Approval of supervisor | Institution • Official title • Name Div. Molecular Pathobiology, CZC • Professor • Hirofumi Sawa <div style="text-align: right;">印</div> |
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- ※1 Send the electronic file to the Leading School section, International Affairs Office, also submit the original print out with seal of supervisor to the Leading School section, International Affairs Office.
- ※2 Attach a copy certificate of the content of internship activity that is prepared by the counterpart at the internship institution (any form with a signature of the counterpart).
- ※3 The Steering Committee of the Leading Program will first confirm the content of this report and report will be forwarded to the Educational Affairs Committee for credits evaluation.

Submit to : Leading School section, International Affairs Office

Ext: 9545 e-mail: leading@vetmed.hokudai.ac.jp