（Abroad）Official trip report form（Student） 2016/4/5 (Year/Month/Day)

Name	Ryuji Kaede
Laboratory	Biochemistry
Year (Grade)	3
Destination	University College Dublin
Period of trip	3/12/2016 - 3/20/2016
Purpose of trip	To take part in "UCD-HU (University College Dublin, Ireland and Hokkaido University) graduate student exchange program 2016.

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

This year has started UCD-HU (University College Dublin and Hokkaido University) graduate student exchange program 2016 in Ireland. We were first Hokkaido University graduate students to take part in this program coordinated by Prof. Stephan Gordon in UCD. This program consisted of the lectures “ADVANCES IN INFECTION BIOLOGY 2016” to study an overview of current research developments in the infection biology area, and how these are translating into novel therapeutic modalities, and acquiring key points of animal research ethics and grant writing. The participants of this program are about 30 members from four universities including Hokkaido University (Figure 1).

This lecture covered the study of the infectious agents including bacteriology, virology, parasitology, and prion diseases. The main contents of the lectures are host-pathogen interaction, infection models, epidemiology, systems approaches, and therapeutics (Figure 2).

Figure 1. Participants in a class scene.

The list of each class title for 3 days is as follows:

(Day1)

1-1. One Health and *Mycobacterium tuberculosis* (*M. tuberculosis*)

1-2. Oncogenesis and viral infection

1-3. Bacterial interaction with Platelet in bloodstream infections

1-4. Limitations in treating bacterial infections

1-5. Antimicrobial resistance

1-6. Gram positive bacterial cell wall as a target antimicrobial

(Day2)

2-1. Anti-parasite vaccines

2-2. Vaccine for meningitis (mainly bacteria)

2-3. Novel approach as to vaccination against tuberculosis

2-4. Viral epidemiology in Africa

2-5. Childhood pneumonia – a global health perspective

2-6. HIV – What's new?

(Day3)

3-1. *Campylobacter jejuni*

3-2. Glial cell activation in prion disease

3-3. Arbovirus interactions with the innate immune system

3-4. Animal research ethics

3-5. Grant writing

Each day has 6 or 5 classes. The number of total classes is 17; 9 classes are categorized as bacteria, 4 as virus, 1 as parasite, 1 as prion, 1 as ethics, and 1 as grant. I felt the order and contents of classes were very great.

Monday 14th March	***(1) Host-pathogen interaction***	10:00 - 10:15	Prof Stephen Gordon *Introduction*
		10:30 – 11:15	Prof Stephen Gordon *Human and bovine TB*
		11:15 – 12:00	Dr Noreen Sheehy *Oncogenesis and viral infection*
		12:00 – 12:45	Dr Jennifer Mitchell *Bacterial interactions with platelets*
	(2) Antimicobials	13:30-14:15	Dr Kirsten Schaffer *Current limitations in diagnosis and management of infectious disease*
		14:15-15:00	Prof Shea Fanning *Antimicrobial resistance*
		15:00 – 15:15	*Break*
		15:15- 16:00	Prof Kevin Devine (TCD) *Gram positive bacterial cell wall as a target for antimicrobials*
Tuesday 15th March	***(3) Vaccines***	10:00-10:45	Prof Grace Mulcahy *Parasite Vaccine development*
		10:45-11:30	Prof Ed Lavelle (TCD) *Fundamentals of Vaccinology*
		11:30 – 12:15	Dr Joe Cassidy *Novel approaches to TB vaccination*
	(4) Global Health	13:30 – 14:15	Prof Hirofumi Sawa (Hokkaido University, Japan) *Viral Epidemiology in Africa*
		14:15 – 15:00	Dr Joe Gallagher *Childhood pneumonia*
		15:00-15:15	*Break*
		15:15 – 16:00	Dr Aoife Cotter *HIV*
Wed 16th March	***(5) Zoonosis***	10:00- 10:45	Dr Marguerite Clyne *Campylobacter*
		10:45- 11:30	Prof Motohiro Horiuchi (Hokkaido University, Japan) *Glial cell activation in prion diseases*
		11:30 – 12:15	Dr Gerald Barry *Arbovirus interactions with the mammalian innate immune system*
	(6) Experimental design and grant writing	14:00 – 14:45	Dr Mark d'Alton *Ethics of Animal experimentation*
		14:45 - 16:00	Prof Stephen Gordon *Experimental design, grant writing and overview of assessment*
Tues 12th April	*Student Grant presentations*	09:30-15:00	All students (Charles Institute Seminar room)

Figure 2. Class schedule of ADVANCES IN INFECTION BIOLOGY 2016

The points of each bacterial class are follows:

- There are different immune responses to *M. tuberculosis*.
- The circulating platelet is binding some bacteria and causes sepsis. The binding molecules are CD36 of the platelet and bacterial cell wall.
- Deaths from drug-resistant infections are more and more increasing. As an example, *Pseudomonas aeruginosa* was focused on using moth as in vivo model. Considering about the post-antibiotic era is important in the near future.
- Anti-microbiotics are spreading worldwide. The abuse such as in China and U.S.A. contributed to genesis of drug residence-plasmids. Understanding this may improve drug usage for large scale medicine.
- Features of bacterial cell walls are the dynamic structure and components including wall teichoic acid. Teixobactin, a novel antibiotic, is targeting on inhibiting the cell wall synthesis.
- Immuno-response level to *M. tuberculosis* depends on the immunogenicity. H56 triple fusion protein vaccine is more effective for attenuating tuberculosis pathogenicity than H1 subunit vaccine in mice and monkeys.
- Current diagnosis cannot show a clear cause of *Pneumoniae*. The distribution is much more than estimated and further development of diagnostic techniques is needed.
- The difference of the immune-response to *Campylobacter* between chickens and humans may be related to mucin and cause the difference of symptom between them.

The points of each virus, parasite, and prion class are follows:

- Viruses cause 15% of total cancers. Human T-cell Leukemia is caused by virus infection. The pathogenesis is complex involving host-vial and vial-vial protein interactions. Virus Tax-1 is a key protein interacting with host transcriptional regulation AP-1 signaling.
- Surveillance of viruses in African wildlife is conducted using serological and gene detections. Detection of Paramyxovirus from shrews is first report. Metagenomic analysis of the feces of shrew showed novel mammalian viruses (Parvoviridae, circoviridae and so on).
- The number of HIV by STD is increasing. The treatment is also being improved. The patients tend to have low bone marrow density and have a bone fractured.

- Roughly 80% of viruses that infect human beings are zoonotic, such as Dengue, Chikungunya, Zika virus, Bluetongue virus, Schmallenberg virus. Interferon is a key of host immune to virus infection. Arbovirus proteins inhibit IFN pathway.
- In addition to drugs, vaccines are also useful for protection of Helminths infection. First trials to produce effective vaccines are understanding the immune-regulation after the liver fluke infection and determination of recombinant antigen target sites.
- Prion antibody therapeutics for Prion disease is being developed. Microglial activation is strongly related to Prion disease.

We had a chance to do and listen to research presentations by graduate students as appealing practice. Their works stimulated me and made me ask some questions (Figure 3).

Figure 3. Presentation time by graduate students.

And we also had UCD Veterinary hospital tour which gave us a lot of information including large and small animal veterinary medicines (Figure 4).

Figure 4. Practical room for clinical veterinary medicine education

As for international culture exchange, we were guided around the center of Dublin city and UCD facilities such as a movie theater by Prof. Gordon laboratory members. We enjoyed international exchange with them by going sightseeing and watching the movie (Figure 5).

Figure 5. Movie theater in UCD.

Prf. Gordon prepared sandwich at lunch time and we had some chances to talk to other university students and deepened our friendship. Even now, I keep in touch with a UCD student by e-mail.
In addition, Prf. Gordon picked us to an Irish restaurant with traditional music and dance performance (Figure 6). I had a lot of fun by various types of first experiences.


Figure 6. Irish restaurant with traditional dance performance.

Through this program, I had great experiences of both studying abroad and promoting international exchange and these experiences made me grow a lot as a Leading Program graduate student. I'm grateful for such a splendid chance by Leading Program.

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