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

（Abroad・Domestic）Internship report form（Student） 2017 Dec 15 (Year/Month/Day)

Name	Lai Lai San
Laboratory	Division of Bioresources, CZC
Year (Grade)	D4
Internship institution	The Research Institute of Tuberculosis/ Japan Anti-Tuberculosis Association, Tokyo
Internship period	Internship period: 11/06/2017 - 12/08/2017 (Departure Date from Sapporo: MM/DD/YYYY, Arrival Date in Sapporo: MM/DD/YYYY)
Purpose	(1) To understand the practical situation in a working field, Research Institute of Tuberculosis/Japan Anti-Tuberculosis Association (2) To learn how to handle and do research on the tuberculosis disease in the practical field (3) To apply the knowledge and experience in the future career

- The reason why you chose this institute

I am doing research on molecular characterization of *Mycobacterium tuberculosis*, including drug resistant conferring genes detection, the identification of the Beijing genotype and mycobacterial interspersed repetitive unit-variable number of tandem repeat (MIRU-VNTR) typing of *M. tuberculosis* from Myanmar.

Research Institute of Tuberculosis/Japan Anti-tuberculosis Association is doing similar kind of researches. Moreover, RIT is a World Health Organization (WHO) collaborating center for TB research and training and is appointed as a "WHO Supra National Reference Laboratory". I planned to learn the advanced bacteriological examination, various methods concerning with *Mycobacterium* species and external quality assessment (EQA) activities in general clinical laboratories at various levels. This was a great opportunity for me to learn more in a practical way. The EQA method was new to me, and it could be referred to be applied to upgrade the quality control system in Myanmar in my future work. I aimed to have an opportunity to extend my knowledge regarding with vaccine development which was also new to me.

It is well established research institute and it has been giving training to the staffs of developing countries to become well trained staffs as well as contributors to the remaining staffs of their countries. The department of Mycobacterium reference and research (DMRR) is recognized as a substantial national reference laboratory for mycobacteria in Japan. I would like to learn about tuberculosis from well-established institute.

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

Summary of activities

No.	Activity
1	**Learning the basic principle and practice at BSL3 laboratory**
2	**The methods of sample preparation of the smear and culture of *Mycobacterium tuberculosis* and other *Mycobacterium* species**
3	**The basic principle of culturing of *Mycobacterium* species**
4	**Medium preparations for the drug susceptibility testing (Bedaquiline and Pyrazinamide)**
5	**Drug susceptibility testing (DST)**
6	**Lecture concerning with *M. tuberculosis* diagnosis, treatment, drug resistance, recent condition of tuberculosis and policy on tuberculosis according to WHO**
7	**Training of molecular diagnostic methods for identification and drug resistance detection**
8	**Morphological examination of *M. tuberculosis* by ordinary light microscopy, fluorescence microscopy, scanning electron microscopy and transmission electron microscopy**
9	**Artificial sputum smear preparation for the standardization of microscopy**
10	**Discussion on whole genome sequencing and data analysis for the characterization of *M. tuberculosis***
11	**Attending monthly 1st Tuesday meeting at RIT**
12	**Casual sharing knowledge and experience with researchers, Pulmonologist and his co-worker**

(1) Learning the basic principle and practice at BSL3 laboratory

I've learned about the safety practice of BSL3 laboratory including precaution in entry, lab working and exit with the standardized ways in daily working environment.

The entrance of BSL3 laboratory

(2) The methods of sample preparation of the smear and culture of *M. tuberculosis* and other *Mycobacterium* species

The clinical sputum sample preparation was performed in the BSL3 laboratory. I learned as below.

(a) Routine practice of sample preparation with safe and effective technique to get proper result.

(b) The novel research work on sputum sample preparation to make easy and more effective way of detection of mycobacteria.

The research has been doing to develop more safe and effective way of sputum sample preparation of the detection of mycobacteria by developing special equipment.

(3) The basic principle of culturing of *Mycobacterium* species

I learned and performed culture methods of not only *M. tuberculosis* but also *Mycobacterium* other than *M. tuberculosis*.

(4) Media preparations for the drug susceptibility testing (Bedaquiline and Pyrazinamide)

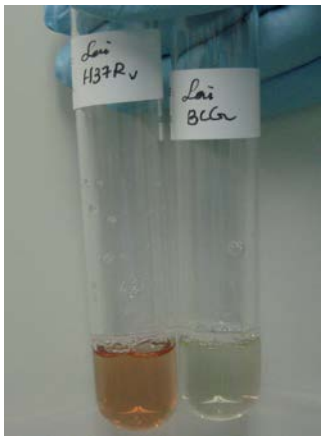
I learned drug susceptibility testing (DST) methods by observing and performing the preparation of the medium for DST for Bedaquiline as well as pyrazinamide (PZA). Bedaquiline is a new anti-TB drug.

(5) Drug susceptibility testing (DST)

(i) PZA drug susceptibility testing

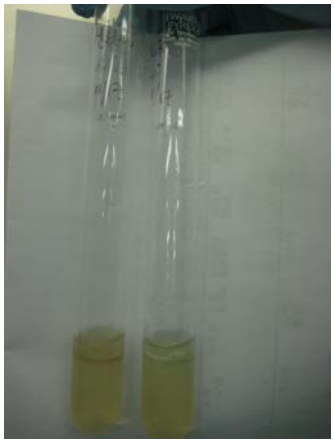
The DST for pyrazinamide needs special medium comparing to the other DST. I learned and performed

(a) Agar medium based PZA DST
(b) MIGIT based PZA DST
(c) PZA DST MIGIT 960 system
(d) Novel PZA DST



PZA DST (MIGIT medium)

PZA DST on agar



(ii) MIC of clarithromycin of *M. abscesses*

I learned MIC of clarithromycin by observing and performing medium preparation, preparation of required drug concentration, inoculating *M. abscesses* in media and interpretation of the result.

(iv) MIC of new anti-TB drug, Bedaquiline, for *M. tuberculosis* and *M. bovis*

Media preparation, adjusting of drug concentration, inoculation of organisms were observed and performed.

(6) Lecture concerning with *M. tuberculosis* diagnosis, treatment, drug resistance, recent condition of tuberculosis and policy on tuberculosis according to WHO

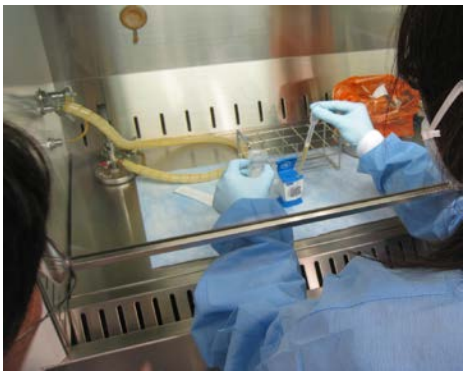
Lecture by Professor Dr. Kai Man Kam

Group photo with Professor Dr. Kai Man Kam

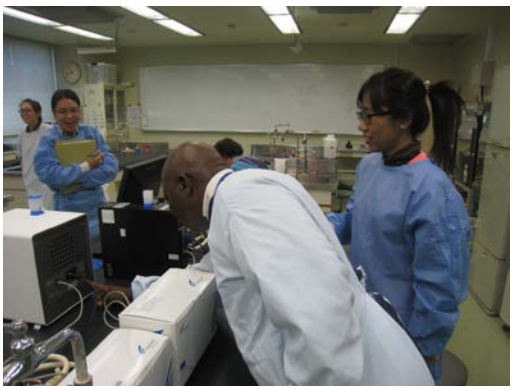
(7) Training of molecular diagnostic methods for identification and drug resistance detection

(i) GeneXpert Training (Lectures and Practices)

Lecture (GeneXpert)



Sample preparation (GeneXpert)



Trouble shooting (GeneXpert)

Group phot after training (GeneXpert)

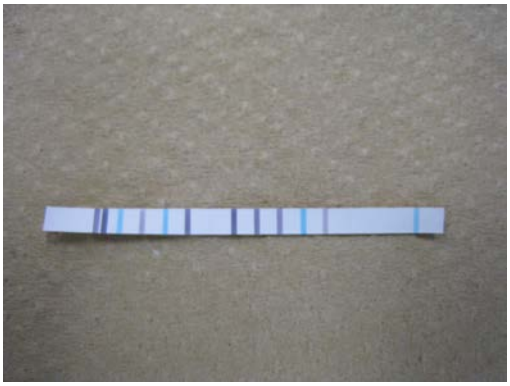
(ii) **Observation of COBAS Taqman MTB test for detection of drug resistance in *M. tuberculosis***

I also observed and learned preparation and performing for detection of MTB by COBAS Taqman MTB test.

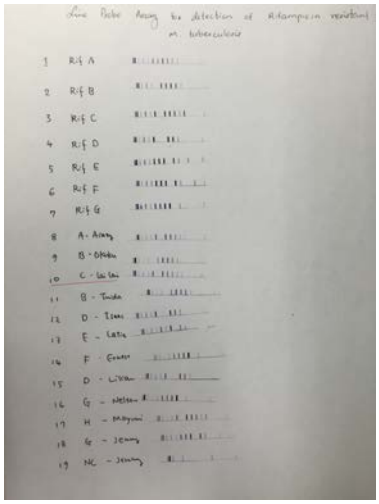
(iii) **Lectures and practices of Line probe assay (LPA)**

Performing of LPA

Group photo after training of LPA



Obtaining result of LPA

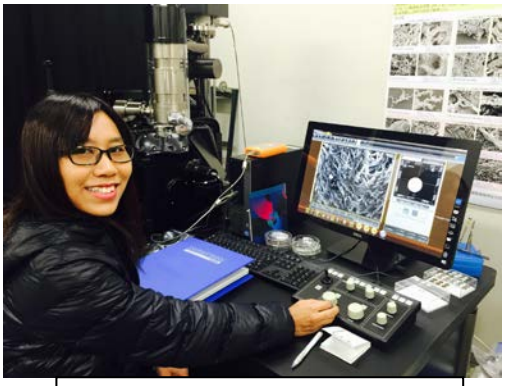


All results of LPA

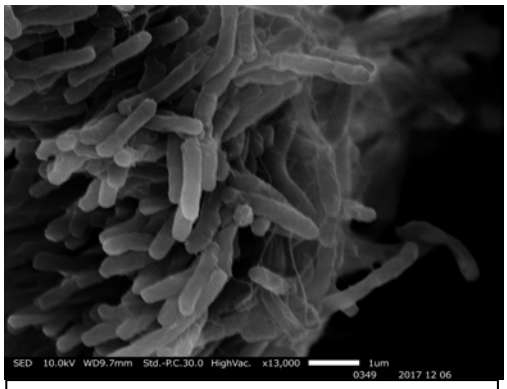
(8) Morphological examination of *M. tuberculosis* by ordinary light microscopy, fluorescence microscopy, scanning electron microscopy and transmission electron microscopy

The staining technique, observation under ordinary microscopy with Ziehl-Neelsen staining as well as fluorescence microscopy and the way of interpretation of mycobacteria count in sputum sample was also learned and performed.

Morphological study of *M. tuberculosis* by scanning electron microscopy and transmission electron microscopy was also learned. The technique of counting of ribosomes in the organism and interpretation of results were also studied.



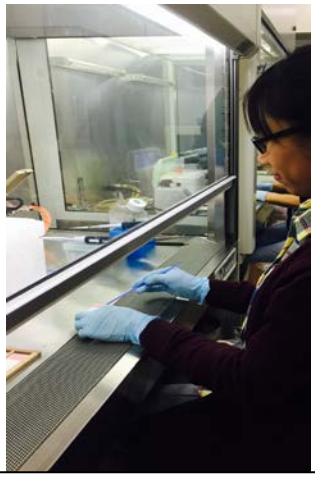
Trying on scanning electron microscopy



Scanning electron microscopy of *M. tuberculosis*

(9) Artificial sputum smear preparation for the standardization of microscopy

Observation of artificial sputum smear preparation



Performing artificial sputum smear preparation

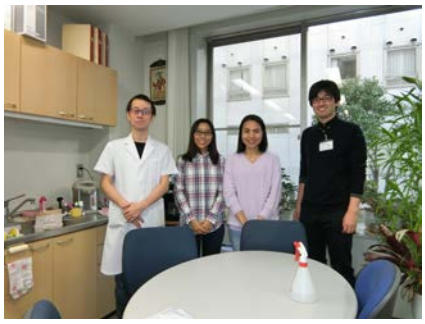
(10) Discussion on whole genome sequencing and data analysis for the characterization of *M. tuberculosis*

I learned from Dr. Murase about sample preparation, DNA extraction and preparation of whole genome sequencing, web-based analysis, and data analysis by different software.

(11) Attending monthly 1st Tuesday meeting at RIT

I also attended the meeting for 2 times. I learned about their recent works via their presentation.

(12) Casual sharing of knowledge and experience with researchers, Pulmonologist and his co-worker.



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

As a positive impact in my student life, I had an opportunity to gain knowledge and experience in the actual situation. I've shared them with my colleagues at my laboratory after this internship. During my field epidemiology study in Myanmar in 2016, I learned the actual condition in the field of tuberculosis disease diagnosis, treatment, prevention and control and research in Myanmar. I realized that some sectors were still necessary to improve. After my graduation, I am planning to continue my research work concerning with *M. tuberculosis* in Myanmar, and I will be able to help point out the necessary things to be improved by referring the practice that was performed at the Research Institute of Tuberculosis/Japan Anti-tuberculosis Association. This internship study will provide knowledge, attitude and practice in the field to expand my knowledge and skill to apply in my future career path.

A group photo (Department of Mycobacterium Reference and Research (DMMR), RIT/JATA, Japan

As I am now doing research on *M. tuberculosis* from Myanmar at Research Center for Zoonosis Control, I will apply my knowledge, skill and experience in my future research work as well as in a part of tuberculosis prevention and control when I come back as a research scientist at Department of Medical Research in Myanmar, which is one of the high burden countries of both tuberculosis and multidrug resistant tuberculosis. I hope that this will be a great help to continue my future career, and I will be able to have a good connection with this institute in the future for the sake of capacity development and human resource development in Myanmar. In the next decade, I am hoping to involve in a situation of managing in controlling of tuberculosis by participating in a local as well as an international management team such as WHO. The benefits of this internship will be helpful to collaborate in fighting against tuberculosis and to carry out smoothly in my future work.

- Advice for your junior fellows

I would like to advice my junior fellows as below,

Please make your goal clear to improve your study. In my case, my plan to go for internship came clear after finishing my field epidemiology study because I realized the things to be learned more for my study at that time.

Choose the appropriate options for your future study and career. In my point of view, I chose this place for my internship because I believed that it can fulfill my knowledge gap and experience for my study and my future career.

Plan what you want to study in the internship beforehand. The earlier plan is the better way of doing internship in your study because you have a lot of things to do in your PhD course.

Approval of supervisor	Institution・Official title・Name Division of Bioresources, Research Center for Zoonosis Control ・ Professor ・Yasuhiko SUZUKI

※1 Send the electronic file 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.

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