Overseas Practice on（Field Epidemiology・Collaborative Research） 2016/06/08

report form（For Student） (Year/Month/Day)

Name	Kiyeon KIM
Laboratory	Division of Bioinformatics
Year (Grade)	4
Place of practice	Department of Molecular Life Science, Tokai University School of Medicine
Period of practice	2016/04/18 – 2016/05/13 (4 weeks)
Purpose	Learning how to deal with next generation sequencing data.

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

From 18th Apr to 13th May, I had a chance to visit prof. Imanishi laboratory in Tokai University located in Ihehara. His laboratory had established a system to deal with human full genome sequence and analyzes genotype of specific disease or some drug sensitivity (resistance). Such an establishment was attractive for me to learn various application of data processing.

During my staying, prof. Imanishi suggested me to study about pairwise sequentially Markovian coalescence (PSMC) and multiple sequential Markovian coalescence (MSMC) for further collaboration between two laboratories. PSMC is applied to diploid genome sequences of one individual with recombination and estimates the time since the most recent common ancestor (TMRCA). Once TMRCA is estimated using Markovian approach, then simply effective population at TMRCA is available sequentially. This sequential data can be used to reconstruct population history. MSMC is another type of PSMC, which used more than two individuals. The strength of MSMC is that it could reconstruct population history in nearer past than PSMC. On the other side, estimation of population history in further past is more reliable in PSMC than MSMC. It was very interesting topic for me. Though I have studied coalescence theory and I sometimes tried to estimate effective population history, targets of all of these trials were restricted to haploid data like influenza. It was good chance to expand my interest to diploid (Fig 1.).

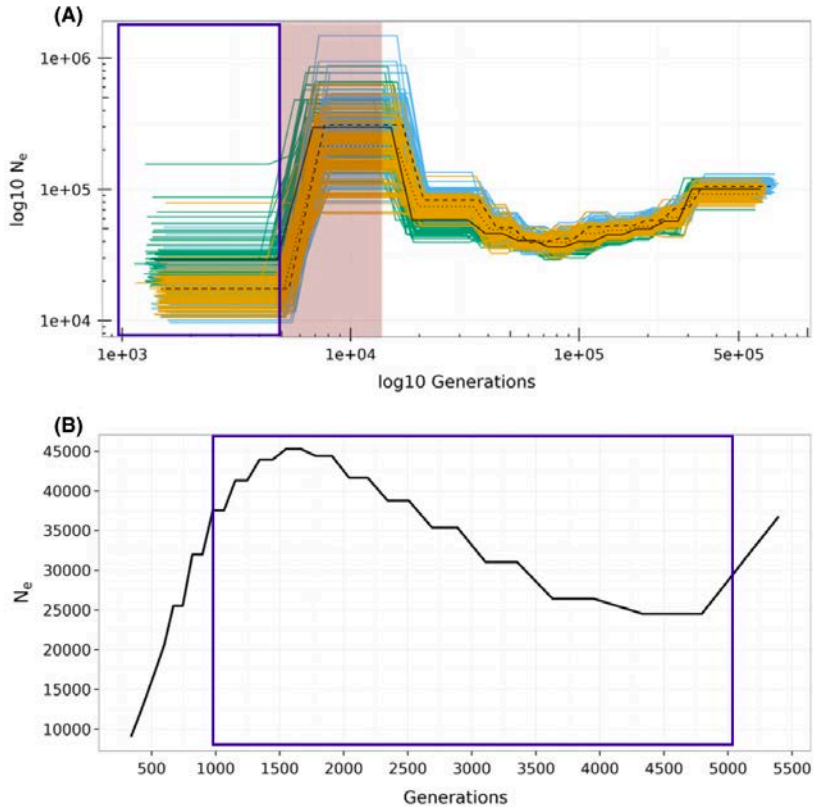


Fig 1. Both graph showed reconstruction of population of nematode, *Wuchereria bancrofti*, from mosquitoes using (A) PSMC and (B) MSMC conducted by Small *et al*...(B) showed detailed estimation in near past than (A). In both graph, x-axis is time (generation) and y-axis is effective population. Blue rectangle showed same time interval [1].

There were two goals in this collaboration. At first, I really needed to understand this method, To get a better understanding, I read several articles introducing this method and various application. And I introduced interesting articles to laboratory members every week and had a discussion, except “Golden week”. Unfortunately, I could not understand its mathematical background completely, but it was good challenge to me. Second, I need to prepare temporary proposal for further collaboration. That meant I needed to apply this method to infectious disease. Almost every researches using PSMC or MSMC had focused on reconstructing population history of anatomically modern humans or extinct/endangered animal. These methods had been rarely used for disease control. So while I was staying there, I tried to prepare proposal regarding to applying this method to zoonosis control.

I was not only focusing on research part but I really tried to adjust routine of new laboratory and learn helpful routine. Every Monday, there was a laboratory meeting in the morning. During this time every member confirmed week unit schedule of each members.

Interestingly, there were frequent reading circle and anyone who is interested was welcomed and presenter did not have to prepare slides. I might be wrong but I thought that slide was indispensible for presenting and preparing slide was somewhat a kind of burden to me. Sometimes I thought that I should better focusing on understanding the article than preparing slides. Such a reading circle was like a story telling of research articles. If presenter did not know clearly, it was very natural to move to the discussion. So, I did totally, four presentations, it was not that huge burden to me (Table 1). (But definitely, I agree the importance and necessity of slide also!) Other interesting routine was teatime. Everyday, around 3 pm, there was teatime. It was a moment of relaxing and communication for every member including professors, Post–docs, technicians, secretary, and students. It might be possible because Imanish's lab is not wet laboratory. For me, it was great timing to be alert from drowsy after eating.

I also enjoyed scenery nearby. Though I used my time for preparing proposal during the golden week, I had a time to go out of the city. And I tried to enjoy time free time during the weekend as possible as I can. I climbed 大山, unfortunately after rain, which were located in boundary Isehara. Also I visited 鎌倉—江ノ島 area. It was very old city with huge Buddha. I really enjoyed 江の電. Small and short train was passing by right in front of main gate of residence area. Also I could not forget sunset of 江ノ島 with 富士山.

I really enjoyed my four weeks in Tokai University. Now I expect further collaboration between two laboratories. I feel thankful to every one who supports this collaboration. I grateful to prof Ito who suggested me to collaborate also I am thankful to prof. Imanish who kindly accept my staying in his laboratory. Also, I want to say thank you to every officer in leading office especially, Ms Maki, Thanks to her, I could rent the room in time.

Table 1. Daily schedules during my staying.

	Mon	Tue	Wed	Thu	Fri
4/18 -4/22	Lab meeting, Building introduction Desk setting	Discussion (topic-PSMC)	Preparing reading circle	Reading circle (**Kim**)	Journal club
4/25 ~4/29	Lab meeting, Seminar (**Kim**) Welcome lunch	Progress meeting	Preparing reading circle	Progress meeting Reading circle (**Kim**) Research introduction	Discussion about temporary proposal
5/2 ~5/6	Lab meeting	Preparing proposal draft	Day-off	Preparing proposal draft	Preparing proposal draft Dinner with prof. Imanish
5/9 ~5/13	Lab meeting Preparing reading circle	Reading circle (**Kim**)	Journal club Reading circle	Farewell party	Research seminar Discussion

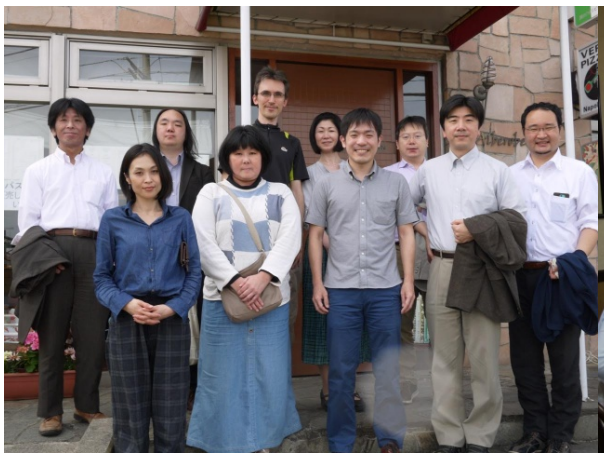
Reference

[1] S. T. Small, L. J. Reimer, D. J. Tisch, C. L. King, B. M. Christensen, P. M. Siba, J. W. Kazura, D. Serre, and P. A. Zimmerman, “Population genomics of the filarial nematode parasite Wuchereria bancrofti from mosquitoes,” *Mol. Ecol.*, vol. 25, no. 7, pp. 1465–1477, 2016.

<大山>

<View from 江ノ島>

< Sunset of 江ノ島 with 富士山>



< Welcome lunch>

< Farewell party>

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