Overseas Practice on （Field Epidemiology・Collaborative Research) report form (For Student)　2015/11/10 (Year/Month/Day)

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Laboratory	Wildlife Biology and Medicine
Year (Grade)	D4
Place of practice	Gruppo Ricerca Ecologia Animale, Fondazione Edmund Mach di San Michele all'Adige, San Michele All'Adige, Italy
Period of practice	15 November to 1st of December 2015
Purpose	Collaborative research

- **The reason why I chose this institute**

Gruppo Ricerca Ecologia Animale, Fondazione Edmund Mach of Italy is one of the few institutes in Italy that are interested in wildlife ecology and diseases epidemiology. In particular, this institute is interested in understanding and predicting how certain pathogens, especially those impacting on human health, cause diseases outbreaks in Europe and in the rest of the world. They have experience on several disease models, but especially on *Anaplasma phagocytophilum*, tick-borne encephalitis (TBE), Lyme disease, rodent borne diseases and West Nile disease. Professor Annapaola Rizzoli (Fig. 1) is the leader of this group, her major expertise is in the field of parasitology, wildlife diseases ecology & epidemiology and risk assessment of emerging vector-borne and zoonotic diseases. My first time to meet her was at 2014 in the 63rd International Conference of the Wildlife Disease Association, USA. Since then, she has been encouraging me to collaborate and to meet her laboratory members through skype (Fig. 2).

Fig. 1. With Professor Annapaola Rizzoli

Because my PhD studies included results about the ecology of 5 tick-borne pathogens including *A. phagocytophilum*, *A. bovis*, *Candidatus* Neoehrlichia

mikurensis, *Ehrlichia muris* and *Babesia microti* in Japan, I believed that it will be scientifically useful to share my work with this group, which would help to better understand these results and to use their experience in the statistical modelling to analyse my data.

- **Result of the activity**

My and Professor Annapaola's main goal from my visit was to create a channel of collaboration between our laboratories that can continue in the future. To make sure this will be successfully established, we needed to exchange our knowledge and summarize our current projects to each other.
The following activities were accomplished:

I. Introduction to the research group:

From day one, Professor Annapaola introduced me to the research groups and laboratories including the unit for DNA and RNA extraction, sequencing platform sampling sites and the members responsible for the statistical analysis.

II. Visiting the rodents and ticks sampling site:

I joined Professor Annapaola in a field trip to the sampling sites on the Dolomites Mountains where the research team collects the rodent and tick samples (Fig. 3)

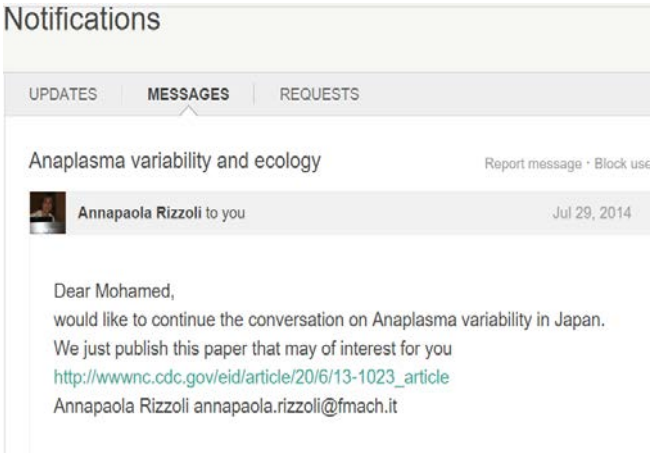

Fig. 2. First contact from Professor Annapaola

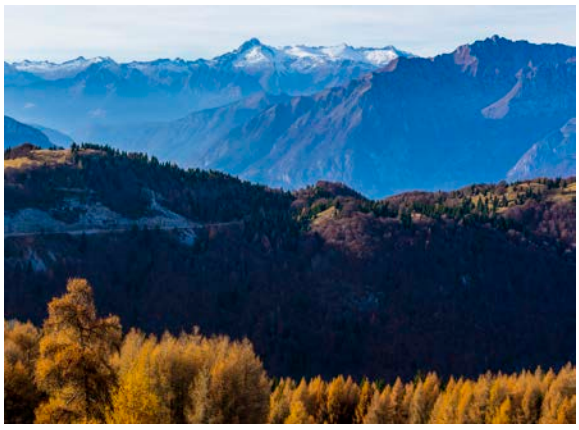

Fig. 3. Dolomites sampling site

III. Exchange of knowledge:

This was accomplished through attending the Laboratory of Excellence for Epidemiology and Modeling (LExEM) project symposium (Fig. 4). This was an excellent opportunity for me to gain knowledge about the current research that is being done in the foundation. During this symposium, I have been asked for collaboration to provide samples for the genetic comparison between *Aedes koreicus* from Japan and Italy.

Fig. 4. With the members of LExEM project

In addition, I presented the status of zoonotic tick-borne diseases in Japan to the members of the foundation of Edmund Mach. During this presentation I had many useful ideas for future collaboration and opportunities.

IV. Training on "R" software and statistical modeling

I have received a condensed training on "R" software by Roberto Rosa (Fig. 5). The main focus was on the data organization, model selection and analysis. Roberto explained the basics and helped me to understand how to perform generalized linear model (GLM) with binomial error distribution.

This was the main collaboration between me and Fondazione of Edmund Mach. In Japan, my research obtained information about 5 potentially zoonotic tick-

borne pathogens in 6 small mammal species, which have different age and gender. It was needed for my study to understand the effect of different variables on the prevalence of each pathogen detected. To do this, a suitable statistical modelling was needed to analyse our results.

After the training, I was able to build 3 different models to examine the prevalence of each tick-borne pathogen (Fig. 6).

Fig. 5. With Roberto Rosa

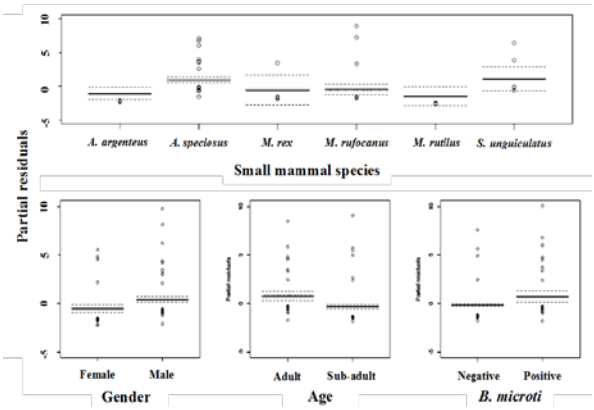

Fig. 6. A representative GLM model output for *Candidatus* N. mikurensis

Afterwards, Professor Annapaola and Roberto helped me in writing the results and discussion. They shared with me the possible interpretation for my results and suggested the academic journals for our next publication.

V. Gathering information about possible future collaboration:

I had several meetings with Professor Annapaola Rizzoli and Professor Heidi Hauffe (Fig. 7), the leaders of the molecular biodiversity and ecology section of the foundation, to discuss the potentiality of continuous collaboration between our laboratories. They provided information about the postdoctoral positions available in their department and were interested on the leading program opportunities for scientific visits.

Fig. 7. Prof. Heidi Hauffe

Two possible future collaborations were suggested, one is to provide DNA samples of *Aedes koreicus* from Japan to compare its genome sequence with the Italian types. The other collaboration opportunity is to exchange of ideas about the tick blood meal

analysis. They introduced me to Dr. Margherita Collini (Fig. 8), who developed a novel technique to study the tick blood meal sources. Dr. Collini shared with me her recent publications and explained the novel technique, which was developed by her research group. She showed high interest on collaborating with me on my future studies in Japan.

Fig. 8. Dr. Margherita Collini

- Positive impact of the activity

1. Networking and communication:

During this visit I could build a network of communication with several researchers. This will help me in the future to collaborate and exchange of scientific ideas.

2. Data analysis and experience:

I could understand the statistical modelling and analyzed my data results from Japan. My results are now ready for publication and my collaborators will be added as co-authors.

3. A future collaboration opportunities:

During this visit, I discussed 2 possible projects with the Italian researchers. I will do my best to continue this collaboration in the future.