AsOBiNet Report 6-12 March 2014

Special Training for FT-IR Technique in Marche Polytechnic University

Graduate School of Life & Environmental Sciences
1st year Master Course
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First of all, I sincerely appreciate the financial support by the AsOBiNet program and its organizer, Prof. Dr. Yoshihiro Shiraiwa of the University of Tsukuba. I would also like to thank Prof. Mario Giordano of the Marche Polytechnic University, who kindly let me stay in his laboratory and gave me a lot of advice on using FT-IR during this trip.

From 6 to 12 March in 2014, I visited Marche Polytechnic University in Ancona, Italy to meet Prof. Mario Giordano and learn the special technique of **Fourier Transform Infrared Spectroscopy** (**FT-IR**). FT-IR was originally developed from classical IR technique. Because of its advantages such as high sensitivity and high speed scanning, the use of FT-IR is becoming quite common. FT-IR analysis has mainly been used for homogenous samples such as a homogenous solution or gas, however, **Prof. Mario Giordano** reported that he successfully applied this technique on algal dried cell samples and successfully measured the ratio of carbohydrates, lipids and proteins. This fact shows FT-IR can be applied not only homogenous samples, but also non-homogenous sample as well. Since my group is working on marine microalgae and its physiology, FT-IR can be a convenient method for monitoring of carbohydrates, lipids, and proteins in algal cells. This is why I visited Prof. Giordano's laboratory. In this report I would like to introduce my activities there and my impressions of this trip.

"**Ancona** is located north-east shore of Italian peninsula facing to the Adriatic Sea".

Ancona is located north-east shore of Italian peninsula facing to the Adriatic Sea. Its history starts from the 4th century BC, when the ancient nation *Siracusa* firstly established that town and named it Ancona. In past days Ancona used to be one of remarkable city-states in Italy. Now, Ancona still plays important role as a ferry port and landing harbor facing the Adriatic Sea.

After the 12 hour flight to Rome and a one hour flight from Rome to Ancona, I had finally arrived. It was late in the evening of Thursday 6 March. At that night **Dr. Alessandra Norici**, who works in Prof. Giordano's laboratory, kindly drove me to the hotel. I had already made a contact with Dr. Norici before this trip, and she managed not only transportation from the airport but also my accommodations during my stay. I spent my first night in the hotel, and from next morning I started my work in Prof. Giordano's laboratory. There are many bus lines in Ancona, so that students usually commute by bus. And like the other students, I used the bus to go to university.

View from road to Cathedral

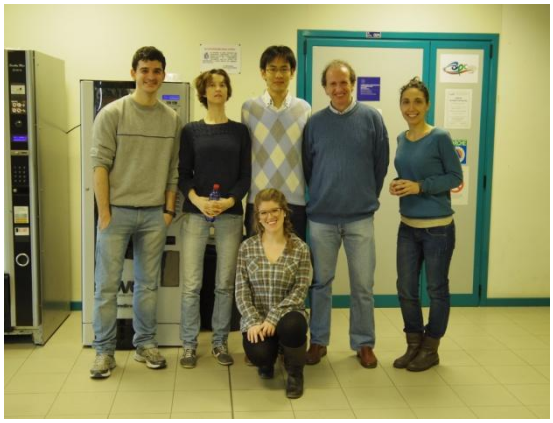
That morning I learned how to use the FT-IR from Dr. Norici. In the afternoon I had an initial discussion with Prof. Giordano and Dr. Norici about my work plan. They were both teachers in Marche Polytechnic University and at the same time well experienced FT-IR users. After our discussion **we analyzed alkenone/alkene samples** which I extracted from *Emiliania huxleyi*, a marine microalga that I use in my work. These two compounds are uniquely-structured lipids and a very limited number of organisms can produce them. Since I'm studying on these compounds in our laboratory, detection of these lipids by FT-IR was one of my purposes for this trip. This is why I brought both a cell sample and an extracted lipid sample. As a result of first run, we observed one unique peak and found that the peak comes from the unique structure of alkenones/alkenes. Thus, we found one promising peak on the first day.

Author in Prof. Giordano's laboratory with the FT-IR

Since I had only three working days in my visit, I had to learn the method of

FT-IR of Prof. Giordano's laboratory as soon as possible. Also, during the same period, I had to confirm if their method was applicable for our purpose. **In the following days, I measured my cell samples.** I brought three samples to the laboratory: these were *Emiliania huxleyi*, *Isochrysis galbana* and *Pleurochrysis carterae*. The first two, *Emiliania* and *Isochrysis*, produce alkenones/alkenes but *Pleurochrysis* does not have them. Running the samples through FT-IR showed that the method worked well for our algae. Interestingly, in the case of *Emiliania* I could not obtain any data because of difficulty of sample preparation.

In the morning of my departure, I once again discussed results I obtained with Prof. Giordano and Dr. Norici. They gave me some useful comments and finally showed how to calculate and analyze the raw data.



Aside from work, during this period I had one weekend to walk around town with my friends in the laboratory. They introduced their town and its history to me. By walking around with them, I could see many things and feel the atmosphere of foreign country. I think I could not see or feel such things if I were just a traveler. Now I know what is most important when you go abroad: it is your interactions with people there. Throughout this trip, I had many opportunities to interact with other people. Of course this was true in laboratory. I had to learn many things and ask colleagues for their opinions. But even outside of laboratory, it was also true. By talking with people you can learn much more about the people themselves, their town, country, and history. However, in order to communicate deeply we have to know their language. This time I felt the importance of improving my English skills. Since I did not know Italian completely, English was the only way to communicate. Throughout this trip, I wished I could speak English more fluently. If I ever have an opportunity to travel again somewhere, I would definitely take it since I think it is the best way to improve myself.

Lastly, **I would like to thank Prof. Mario Giordano and Dr. Alessandra Norici once more for everything** during my trip. I would also like to show my gratitude to **my colleagues** there, as well as to **AsOBiNet** and its organizer **Prof. Yoshihiro Shiraiwa**.