

Juan Miguel Recto
Report on trip to UK



My main purpose in travelling to UK was to accompany Shiraiwa-sensei in visiting several researchers working with *E. huxleyi*. We would discuss the scope of our works, and perhaps also get their insight into our research, and possible collaborations. We met with 3 researchers: Dr. Gill Malin and Dr. Thomas Mock of the University of East Anglia (UEA) and Dr. Johnathan Napier of Rothamsted Research.

Our first stop after a brief stay in London was the Norwich Research Park in Norwich. The research park is located next to UEA, and has strong ties with the university. Graduate students of UEA have the option of doing their research in the NRP. The research park includes the Institute of Food Research (IFR), and the John Innes Center (JIC) and the Sainsbury Laboratory (TSL) which both specialize in plant science and microbiology.



I was quite fortunate to be able to attend an ELSA workshop in the IFR. The workshop comprised of a series of seminars by members of the different institutes, each introducing the work that they're currently doing. Its main purpose is to create an avenue for collaborations among researchers of NRP and UEA. Attending the workshop gave me the chance to learn about the research being conducted there. Held under the theme of adaptations to climate change, it was at this workshop where I met Dr. Gill Malin and Dr. Thomas Mock, who was a presenter.

Dr. Mock was interested in how marine phytoplankton would react to increased temperatures due to global warming. His team took metatranscriptome samples taken from different regions: Arctic, Antarctic and Equatorial, and clustered them based on biological processes. Through canonical correspondence analysis, they were able to show that protein synthesis increases at higher temperatures, even though at the same time the number of ribosomes decreases. The implications of their findings are still being studied. Another interesting talk was given by Dr. Alastair Grant on the genetics of responses to climate change. He argued that responses controlled by single genes, that is,

Mendelian genes with large effects, were most important in adapting to sudden changes in the environment. Unlike traits controlled by several genes, single gene phenotypes were more easily passed on to future generations. Rapid quantitative evolution, however, does occur in nature and it would be through the study of a species living across a wide range of environments that its mechanism might be discovered.

The next day, Shiraiwa-sensei presented our research activities to an audience in the UEA. After sensei's presentation, we sat down with Dr. Malin and Dr. Mock and had a short discussion over tea. Regarding my research, I learned that transformation of *E. huxleyi* had been attempted before by a student of Dr. Mock with little success. However, they were able to detect the presence of the vector in subsequent cultures. I also learned that growth of *E. huxleyi* on agar plates was possible through a special procedure, and Dr. Malin sent me a copy of the protocol. Dr. Mock mentioned he had a project to sequence the genome of *E. huxleyi* RCC1217 as an alternative to the published sequence of CCMP1516. After the discussion, we paid a visit to Dr. Malin's lab. Dr. Malin specializes in DMS production of *E. huxleyi* and her lab has special instruments to measure just that, such as a cryogenic purge and trap to concentrate DMS before feeding it into a gas chromatograph.



On returning to London, we then travelled to Rothamsted Research in Harpenden . Rothamsted Research is an institute that specializes in plant research, similar to JIC and TSL. We went there to visit Dr. Johnathan Napier, who also did some work on *E. huxleyi*. The main theme of Dr. Napier's research is to resolve metabolic pathways for the synthesis of important compounds in phytoplankton, so that these pathways may be implanted in plants. In *E. huxleyi* his group was able to identify several elongases and desaturases for the synthesis of DHA. Activity of these enzymes was verified through expression in yeast cells using a simple yeast expression vector. This technique is very interesting because it may be useful in identifying genes involved in alkenone synthesis.

In discussing with Dr. Napier, he mentioned that they no longer cloned genes but instead obtained sequences directly from published genomes, which they would send to Genscript for synthesis. Artificial gene synthesis is allows them to optimize the codon usage for yeast cells, because *E. huxleyi* has a strong codon bias which may interfere with gene expression. According to Dr. Napier, this process was less costly and time consuming. At the end of the discussion, we agreed that the best way to learn the procedure would be to try it out for ourselves and see how it works out, and if we had any questions we are free to contact him.



Apart from meeting with various scientists, we also had time to do a bit of sightseeing, especially around London. London is a very old city, and I could see it in the architecture of buildings and the way the streets were tight and narrow, as if they were originally made for horse carriages. The weather was always gloomy and sometimes rainy, but the people in general were quite nice. The people in London were from many different nationalities and it was quite common to hear a different language being spoken. We were able to spend a short afternoon in the British museum, where we saw important relics of history accumulated by the British Empire such as the Rosetta stone and sculptures taken from the Parthenon. All in all travelling to UK was a wonderful, unique, and educational experience.