Visit Narrative

In my visit to Dr. Iliana Baums' lab at Pennsylvania State University, I investigated the effects of oil spills on the deep-sea coral species *Leiopathes glaberrima* focusing on the changes in their metabolomic profiles. The Deepwater Horizon spill of 2010 has been shown by previous studies to have had a profound ecological impact on the complex ecosystem of the Gulf of Mexico. One reason that deep-sea coral species were affected by this incident was the decision to use chemical dispersants (Corexit 9500) on the oil slick. The reasoning behind this decision was to protect the coastal regions of the gulf from the oil by effectively 'sinking' it. My experiment aimed to investigate the effects of oil and dispersant on the metabolic profile of *L. glaberrima*.

In order to achieve this I set up an experiment where branches of approximately 50 coral polyps were placed in different solutions as follows; 2 jars of seawater and oil, 2 jars of seawater and dispersant (Corexit 9500), 2 jars of seawater, oil and dispersant and 2 jars of just seawater (control). The experiment was subsequently left for 72 hours. Samples were then collected and snap frozen in liquid nitrogen in order to minimize changes in metabolomic profile due to the procedure. These frozen samples were then ground in homogenization tubes and an extraction solution of Isopropanol:Acetonitrille:Water (3:3:2) was added to each sample which were kept at -20C until needed. The samples were then homogenized for 3 x 20 seconds at 6500rpm before being shaken at 4C for 5 minutes at maximum speed and then centrifuged for another 5 minutes at 4C at maximum speed. 250ul of each samples was then transferred to the auto-sampler vials and stored at -80C awaiting Liquid Chromatography – Mass Spectrometry (LC-MS) analysis. The LC-MS procedure was carried out by Dr. Philip Smith at the metabolomic facility at PSU.

The next stage was to analyse the results obtained via LC-MS. I used the software markerview, peakview and lipidview in order to identify different metabolites. This process involved searching databases such as Metlin and Lipidmaps with the mass and retention time of metabolites in order to identify them. Since metabolomics is a relatively new field this process is rather painstaking as only a small number of the database entries actually contain the required MS/MS profiles which allow a putative identification of a compound. However through this method I was able to identify a number of metabolites from a wide range of families of lipids. In order to obtain a definitive identification of a metabolite however one must run an authenticated standard through the same machines along with your initial samples which will be carried out within the next few months.

Overall this internship provided me with a very valuable experience working in a scientific lab. I learned a number of new skills including LC-MS sample preparation and data analysis and would seriously recommend the experience to any interested undergraduates.