My Leadership in Action Experience

Alicia Sanz-Maestro, University of York, masm504@york.ac.uk
Supervised by Dr. Christopher Spicer, Dr. Sophie Moul and Dr. Annie Hodgson

_Overview

- *Part 1: New research. Exploring the incorporation of unnatural amino acids into proteins using codon reassignment technology. (with Dr. Christopher Spicer and Dr. Sophie Moul)*

The possible biotechnological and biomedical applications of proteins, while very extensive, are still found to be constrained by the limited number of natural amino acids we have available to use for such technologies. Screening for and building large libraries of synthetic unnatural amino acids with novel physicochemical properties has revolutionised the field of chemical biology as it builds bridges between purely biological systems and new chemistries, leading to great advances in the development of new chemical probes or alternative function/added functions to existing proteins (A Dumas, L Lercher, CD Spicer and BG Davis. *Chem. Sci.*, 2015, **6**, 50-69).

My role this summer was to explore how three unnatural amino acids were engineered into proteins produced in different cell lines.

- *Part 2: Outreach - DNA model building workshop aimed at Y12 students. (with Dr. Annie Hodgson)*

This consisted of a presentation on the components of DNA and the processes of transcription and translation followed by a model building activity that allowed the students to consolidate what they just learnt.

I was able to chat to the students, not only about the workshop, but also about my project. They had previously learnt about the 20 natural amino acids, so I was able to introduce them to the idea of unnatural amino acids, how they could be incorporated into existing proteins and why this technology is groundbreaking and extremely useful.

_Motivation

I wanted to use this opportunity to test and apply how much I have learnt this past year and a half, both chemistry-wise and with the leadership-in-research training we received earlier in the year. Therefore, I posed myself the challenge of working in a field of research (microbiology and chemical biology) that I had not tackled yet in my career, and share it in the form of outreach. This allowed me to learn how to quickly adapt to a new environment and use this knowledge to inspire new generations.

_Learning outcomes

Firstly, I learnt the importance of sharing real life research and applications in order to inspire. Reading from a textbook will only get a student so far, but by presenting the front line of scientific research, a stronger sense of vocation can be built.

I was surprised and inspired by the students who attended the workshop. As it was a summer school, they could choose what activities they wanted to join in to. Many of them did not intend on pursuing chemistry/biochemistry in the future, yet they were extremely interested in the topic and what being a research scientist was like. This has motivated me to go outside of my comfort zone and explore other areas of study completely different to mine.

In terms of laboratory work, this summer stay involved many long days which would frequently end in a failed experiment, but also many extremely rewarding moments when this hard work led to good results. I come out of these 6 weeks as a more resilient, efficient and independent researcher, able to troubleshoot and quickly adapt to tackle problems that may appear foreign to me without losing sight of my goals and motivations.

Finally, I have found that much of the research I did during this period was highly collaborative. Whereas previously I had mostly worked with only my lab group, this project challenged me to approach other professionals from neighbouring groups. I found that by reaching out I learnt so much more and got many more experiences. I am much more appreciative now of the importance of a big, cohesive yet diverse and multidisciplinary team.

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