“The highlight of my university experience to date”

Gaining laboratory experience is essential for students considering a career in research. Each year, the Biochemical Society awards Summer Vacation Studentships to support undergraduates doing just this. The grants are a stipend of up to £1600 over 6–8 weeks during the summer, with students being supervised by members of the Society. In 2014, we funded 66 undergraduates, working in laboratories across the UK. Below are accounts from Alexander Taylor and Claire Hutchison, outlining their experiences during their Summer Vacation Studentships.

Alexander Taylor

My first day in the laboratory was a nervous one indeed and my mind was full of worries and questions. Although I had practical experience from teaching laboratories, I would be ‘on my own’ for the first time in a complex and perhaps confusing environment and I had no idea what to expect. The aim of my project was to assess the effects of a photo-CORM (photoactivated CORM) on a uropathogenic E. coli strain called EC958, which displays resistance to a wide range of antibiotics. CORMs, or carbon monoxide (CO)-releasing molecules, are a relatively new class of compounds which derive antibacterial activity from the numerous metabolic effects of carbon monoxide, and offer the additional benefits of controlled and targeted release of the gas. Through the course of the 8 weeks I spent in the lab, I was to explore the extent of the photo-CORM’s own antibacterial activity, whether it could act as an adjuvant to antibiotics, and whether there were any interactions between the photo-CORM and other antimicrobials that might provide an insight into its mechanism of action.

After initial growth curves showed pronounced growth inhibition by the photo-CORM, the investigation moved on to the question of whether it could lower the minimal inhibitory and bactericidal concentrations of a range of antibiotics. For a multidrug-resistant organism, this is a scary business indeed, and the resistance was demonstrated spectacularly by the organism’s unaltered growth at concentrations of antibiotic that should kill laboratory strains outright, the fact that it even grew better in the presence of small concentrations of some antibiotics and that bactericidal concentrations of doxycycline were high enough that the antibiotic began to precipitate. Despite the weeks they took to obtain, the results were satisfying: the majority of the antibiotics studied were potentiated by the photo-CORM, and to varying degrees, hinting that hidden in these results might be important information about the photo-CORM’s mechanism of action. The focus of the
investigation then shifted to interactions between photo-CORMs or CO, and nitric oxide (NO), another ligand of haem proteins. These results were equally intriguing, showing that, while CO potentiated NO as a growth inhibitor, under certain circumstances, photo-CORM could reduce its toxicity.

The most exciting aspect of the project was exploring unknown ground, and knowing that many of the results I obtained might never have been seen before. While an expected result was greeted with feelings of triumph, many of the results were surprising, and, although these caused a great deal of head-scratching, they proved all the more thrilling because of it. During the course of the project, I also attended the XVIII International Conference on Oxygen-Binding and -Sensing Proteins in Sheffield, an exciting opportunity which I would never have otherwise had. I enjoyed the laboratory work both for its flexibility and self-directedness, and the opportunity to work with people who were so friendly, helpful and kind, and my experiences have convinced me to pursue a career in research. I am very grateful to the Biochemical Society for funding this opportunity, and I would strongly recommend it to future applicants.

Claire Anne Hutchison

I am extremely fortunate to have been given the opportunity by the Biochemical Society, and Glasgow Caledonian University, to spend 6 weeks in the laboratory this summer working under the supervision of Dr Patricia Martin. Given my particular interest in skin disorders, I was doubly lucky in that the project I was involved in was researching the role of connexins in inflammatory skin disorders with a view to establishing, among other things, whether increasing calcium concentrations could rescue cells from the effects of the leaky hemi-channel activity often associated with such disorders. With my increasing gravitation towards a career in research science, I entered into the studentship hoping that it would fire my aspirations, by giving me a realistic idea what it feels like to work in the laboratory in a research capacity, as well as equipping me with new skills and experience in a host of novel techniques. My expectations in terms of what I would get out of the experience were truly surpassed.

My studentship began with an introduction to cell culture techniques, which I proceeded to use throughout the 6 weeks to maintain my cells. I managed to expose HeLa and HaCaT cells to a number of different challenges, such as different calcium concentrations and to the bacterial cell wall component peptidoglycan, and gained experience in a number of different methods used to interpret the results, such as gel electrophoresis, immunostaining, PCR and MTT assays. Carrying out the immunostaining and the subsequent viewing of the cells on the EVOS® digital microscope was certainly one of my favourite aspects of the research. Not only were the images of the gap junctions in their fluorescent glory incredibly fascinating, but also the ability to challenge cells and visualize the results so soon after was extremely exciting.

The studentship has been an invaluable opportunity; the highlight of my university experience to date. Not only has it allowed me to develop new skills and increase my confidence in the laboratory, generating some great results along the way, but it has also enabled me to meet researchers, at different stages of their career, and draw great inspiration and knowledge from them. The time in the laboratory has, as I had hoped, stimulated my ambitions to become a research scientist. It has also taught me a number of important lessons. I have learned that keeping an up-to-date lab book really is crucial if you want to retain your sanity during the write-up process, or want to go back and repeat something or investigate why something may not have worked as expected. I have also learned to appreciate the benefit of planning your day in the laboratory to get the most out of it and to adopt the ‘if at first you don’t succeed…’ approach. On a more philosophical note, I have come to the realization that there really is no greater reward than getting to do something you love on a daily basis with the added bonus of knowing your research is contributing to the greater good. All in all, the summer studentship has been an extremely rewarding and enjoyable experience and one which I will undoubtedly look back upon as being a turning point in my career path.