Mac Robertson Travel Scholarship Report

About me

My name is Eirini Patitaki and I am from Athens, Greece. I am currently a third-year PhD student in Molecular Genetics at the University of Glasgow, in the School of Molecular Biosciences. My research aims to address food insecurity in the face of climate crisis, using a molecular biology approach. In particular, the focal point of my work is exploring how plants perceive and adapt to environmental signals such as light, temperature and water availability.

In 2024, during the 2nd year of my PhD studies, I was awarded the Mac Robertson Postgraduate Travel Scholarship for the amount of £2,980. This opportunity realised my visit to Cold Spring Harbor Laboratory (CSHL) in New York to carry out research in the lab of Dr Ullas Pedmale, a leading expert in the field of Photobiology, for the duration of nine weeks.

Why did you apply for the Travel Scholarship?

It had always been my dream to travel to the US and experience the academic culture, so when I was presented the chance to receive specialised research training at CSHL, I was delighted. Being able to acquire proteomics skills and work in a productive environment such as the one at the Pedmale lab, would not only enhance my technical and science communication skills but also give me the opportunity to learn the latest advancements in molecular biology and light signalling in plants.

Details of your visit

The aim of my PhD project is to expand our understanding of how light signalling components contribute to plant resilience. Light and temperature, are two of the most important external cues that orchestrate plant growth. However, since these sessile organisms live under highly fluctuating light and temperature conditions, it is quite challenging to decipher the mechanisms that plants utilise to mitigate the effects of a given environment. After genetic screening of approximately 10,000 transgenic lines we

identified a blue-light-inducible gene, whose overexpression led to altered high-temperature physiological responses in an organ-specific manner. Furthermore, we found that these plants control their architecture through spatial regulation of the growth-promoting phytohormone auxin. Understanding how plants respond to abiotic triggers will ultimately enable us to develop more resilient crops.

The goal of my visit to the Pedmale lab, was to further uncover the molecular machinery underlying the light-dependent spatial regulation of plant development, utilising a proteomic approach. Using CSHL's state-of-the-art plant growth chambers we were able to grow plants under controlled light and temperature conditions and identify novel protein interactors that synergistically control thermo-responses. To achieve this, we performed Co-Immunoprecipitation coupled with Mass-Spectrometry with the support of the Proteomics facility at CSHL, who offered me their invaluable help throughout sample preparation and analysis.

In addition to my research endeavours, I had the opportunity to explore the vibrant city of New York where I visited some of the most iconic landmarks and experienced the multicultural food scene. Overall, I thoroughly enjoyed the daily life at the CSHL campus, especially socialising after work at the Blackford bar where we would meet and discuss science among other topics with fellow academics and friends.

Impact of your visit

Our new findings will not only deepen our understanding of how plants adapt to their environment but also enhanced my technical abilities in protein analytical methods and isolating protein complexes from plant tissue. In addition, working in a high-output and stimulating environment that focuses on novel discoveries inspired me and clarified my next career goal. Lastly, this internship strengthened the collaboration and partnership between the Kaiserli and Pedmale groups and promoted knowledge exchange between the University of Glasgow and CSHL.

Overall, it was an amazing and fruitful experience that I would recommend to everyone!

Photos from my time in Cold Spring Harbor Laboratory.

A. The Pedmale group in one of our many outings (from left to right: Vanessa Schoen, Dr Shirsa Palit and Dr Ullas Pedmale). B. Exploring NYC with new friends. C. Plant sample preparation for immunoprecipitation experiments. D. Receiving confocal imaging training from Dr Shirsa Palit.

Acknowledgements

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I would also like to thank Dr Ullas Pedmale for hosting me and offering me specialised training along with the resources to perform my research. Last but not least, I am very

grateful to Dr Shirsa Palit and Vanessa Schoen for their academic support and for taking me on adventures across New York.