MRes Project Feedback from Oona Lessware, July 2021

I am thankful to have received the Lady Emily Smyth Studentship award (funded by the Bristol Centre for Agricultural Innovation) in 2020. The studentship has funded a year's worth of research into an agriculturally relevant topic and has supported me in undertaking a Masters by Research at the University of Bristol. The funding has covered my university fees, research support (e.g. research equipment and consumables), and a stipend for the year.

Figure 1: N. rafflesiana developing

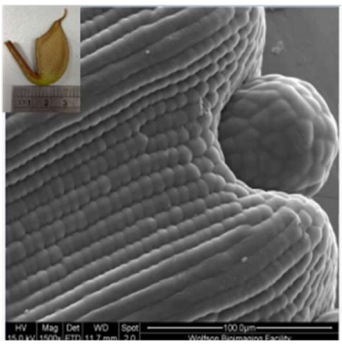

Figure 2: microscopy image of the developing peristome around the nectar gland

My project investigates the developmental biology of a specialised plant surface: the pitcher trap rim (peristome) of Asian pitcher plants (*Nepenthes).* Although pitcher plants are not of agricultural or commercial significance, understanding the development of their specialised slippery surfaces may help us to inspire novel and sustainable pest-resistance approaches in the future. The *Nepenthes* peristome consists of highly specialised epidermal cells that form a hierarchical pattern of micro-and macrogrooves. Unlike most plant surfaces (which are usually water repellent), the peristome of *Nepenthes* is extremely wettable (superhydrophilic). Aided by the specialised hierarchical micro-topography, water spreads quickly over the peristome, forming a stable water film. The peristome becomes slippery, only when wet, causing insects to aquaplane, lose their footing, and fall to their death in the digestive fluid below. Despite being such an intriguing plant surface, its developmental biology is virtually unknown. A large portion of my project has focussed on exploring the developmental stages that underpin the formation of the complex epidermal microtopography of the peristome. This is not a straightforward task, as the peristome develops within closed, growing pitcher buds. Therefore, I have worked on identifying reliable exterior morphological markers that can be used to target specific stages of interior development. I have also used state-of-the-art microscopy techniques to image these developmental stages for the first time. My research will be essential in guiding future genomic studies into the development of the peristome.

The project has equipped me with a plethora of new skills and developed my pre-existing ones. During this MRes, I have been academically challenged and developed new research methods. I have enjoyed learning new techniques such as scanning electron microscopy (SEM). With the help and training of staff from the Wolfson Bioimaging Facility, I am now proficient in several specialised SEM techniques. These include standard SEM, variable pressure SEM, cryo-SEM, and environmental SEM. This year has provided me with my first experience using an SEM independently, an experience that I will treasure. Aside from learning new research methods, I have also been involved in a collaborative laboratory environment for the first time. Working in the Mechanical Ecology Lab has been an invaluable experience that has helped me to develop several essential skills such as improved scientific communication and dissemination of information. I have enjoyed being an active member of our research group. It has been a great opportunity to work with other enthusiastic people with similar, complementary, and contrasting research interests.

Since working on this MRes, I have been lucky enough to have been offered a PhD position. The PhD role will involve working on a related topic, under the supervision of Ulrike Bauer. Without the skills that I have developed during my MRes, I may have not been fully prepared or equipped to undertake this PhD position. This role has therefore propelled me further towards my career goal of gaining a PhD. I am incredibly grateful to have received the Lady Emily Smyth studentship. It has provided me with a brilliant year's worth of research, working on a project that challenges and excites me. The supportive and encouraging group of people around me have enhanced my experience.

Oona Lessware