QMUL Expedition Fund Report

"Why on earth are you being paid to go on holiday to Peru to look at butterflies?" is probably the question I've been asked most since starting my PhD just under 6 months ago. It's a completely fair and important question to be asking – after all, most science is funded by taxpayers' money.

As a state-school student who had never been able to afford to travel outside of Europe, I was beginning to worry that I was undeserving of this money - I had worked hard for this position and funding but I was unable to communicate why it was important to anybody who doesn't work with butterflies. This was until I was speaking to other PhD students in my office working on the evolution of cryptic herbivory in ants – "I don't really care for ants, I am here to answer important scientific questions, and ants allow us to do that."

They were right, this wasn't some selfish trip for me to go on holiday and look at pretty butterflies. This was a chance to add to the body of work trying to understand how some organisms can adapt rapidly to a seasonal climate, and how this might help (or hinder) future responses to anthropogenic climate change. How species in the most biodiverse area of the world will respond to these changes is going to have an enormous impact on not only the local communities that rely on the forest for food, culture and a home, but for everybody across the globe who (however inadvertently) relies on the forest to help regulate the earth's climate.

For my field work, I was based in the Madre De Dios region of Peru. Here, there are two main seasons: the dry and the wet. The peak of each season lasts for around three months on a consistent annual cycle. The dry season here is brutal, with an average of precipitation of just under 50mm a month – compared to 300+mm in the wet season. Therefore, species in this region have to be able to cope and adapt to vastly different environments within just six months. How do they do it?

Some butterflies make use of a behaviour called 'reproductive diapause' during the dry season. This is when adult females completely deprioritise reproduction by not mating with males and halting egg production. This allows them to focus on survival through the dry months, when food and host-plants to lay eggs on are in short supply. Then, when the rains begin again they are ready to produce and fertilise their eggs in a more favourable environment.

With the support of the QMUL Expedition Fund, I was able to visit two sites in the Amazonian Rainforest: Finca Las Piedras near Puerto Maldonado (a highly seasonal environment) and Quince Mil (an area with year-round rainfall). This allowed me to compare diapausing strategies across seasonal and non-seasonal habitats. At each site I collected females of species present in both areas

to later dissect them and compare their egg production and mating behaviour. Later work will then focus on gene expression analysis, with many of the samples kept frozen in RNAlater.

I visited this summer (August ’23) during the height of the dry season at Finca Las Piedras, and was in dreaded awe at the sheer number and size of forest fires I saw. The constant smell of smoke was a reminder of how harsh this environment is, and I was informed that there had been no rainfall for the last 7 weeks – an extreme even for this area. Quince Mil, on the other hand, had heavy rains almost every night meaning the forest was lush, with flowing streams leading down to the banks of the Rio Azara. Separated by just a 4 hour car journey, it was great to experience two of the extreme habitats the forest had to give.

We set up traps at each location to catch fruit feeding butterflies, as well as trawling the local area with hand nets to find those species of interest that weren’t attracted to the rotting banana used as bait. I was just glad that I wasn’t working with the species attracted to rotting fish and urine bait – yes, really.

Long days out in the sun were followed by long evenings processing the samples, helped massively by the team of Peruvian lepidoptera researchers, namely Zunilda and Lizette without whom this work would have not been possible. They welcomed me (and my broken Spanish) instantly and unquestionably, and were kind enough to share their incredible home with me. I would also like to thank QMUL for supporting this fieldwork, as well as my supervisors and lab mates back here in London for all their inspiration and ideas.