Newnham US bursary 2019
Report to the Newnham US Committee

Constanza Toro-Valdivieso, PhD student

I want to express my deepest gratitude to the Newnham US committee and the US alumnae for the opportunity given to me to go to the United States during the summer. This award supported my attendance to the "Genomics of Diseases in Wildlife Workshop" that took place at Colorado State University during June 2019.

At the end of May, I was jumping into a plane that was going to take me directly to California. I know California is not precisely Colorado, and is not even close to it. Do not worry! I did attend the course, but I had to do a quick stop before, and you will know all about it.

As you might know from my application, my research involves the ocean, fur seals and of course, faeces. How does this relates to me going to California? In five words, the answer is fish, heavy metals and the plastic patch. Wait! What?!?

During my first fieldwork back in 2017, I met Charles Moore, an oceanographer known to be one of the first scientists in studying the north pacific plastic patch. When I randomly met Charles in the tiny and remote Juan Fernandez archipelago, he was measuring the concentration of microplastics floating in the South Pacific ocean (very depressing!). During his sailing over the Pacific, he collected all sorts of samples, including a small fish species called myctophids. This fish happens to be the primary summer pray of the Juan Fernandez fur seal. Now, if we go back to my application, you might also know that I am using genetic analysis in my research. This year, however, we collaborated with another research group and analysed a few faeces from my precious collection looking for heavy metals. The initial results were shocking, the concentration of toxic metals such as cadmium, evidenced the high exposure of these marine mammals to pollution, and everything pointed towards pray as the source of exposure.

With our results, the next thing was exploring the fur seals menu, which is mainly composed of cephalopods such as octopus, and our little friends, the myctophids. I did collect cephalopods, but myctophids were beyond my capacities. However, I did remember seeing myctophids pictures from Charles's expedition back in 2017. Thanks to the generous US bursary award, I was also able to stop in California. Once again, I was travelling with unusual items in my luggage (with legal paperwork, of course!). This time it was not smelly faeces but smelly dead fish. Next stop? Fort Collins, Colorado. After sorting out where to put my fish samples, I was ready for what was coming ahead – six days of intense learning in Colorado.

Fort Collins is at the base of the Rocky Mountain foothill. The geographical relief features reminded me a little bit of the beautiful Andes mountains back home and highlighted the flatness that characterises good old Cambridge. But similar to Cambridge, the town is greatly influenced by the university, in this case, the Colorado State University (CSU). CSU is a place full of resources and with significant investments in its facilities and infrastructure. The workshop took place in one of the many conference rooms in the Lory Student Centre, a big and modern building built to serve

as the primary community centre of this establishment.

The five-day workshop was a deep dive into the vast ocean of genomics. If you did not know, genomics is the study of an organism genome. One thing is extracting, amplifying and sequencing DNA. Something completely different is to read and interpret the sequencing information encoded by a combination of A, C, T and G letters, also known as genetic-sequencing data. To understand and analyse this raw data, we need bioinformatics skills. Bioinformatics uses computer science and statistics to identify and understand biological processes from DNA sequences. This workshop was all about learning different bioinformatics skills.

For most of the people, the course started on a Monday, but for people (like me) with poor abilities to talk to computers, there was a "coding for dummies" crush course on Sunday. I must say that sacrificing a day of exploration paid off later on in the workshop. The course covered a wide variety of topics. I don't want to bore you with details, but I can assure you that it was great. One of the things I liked the most was that it was a very hands-on workshop. We would have an exercise after each lecture that would make the learning process much more efficient. There were social activities every night, which was a great ice-breaker, allowing fluent networking.

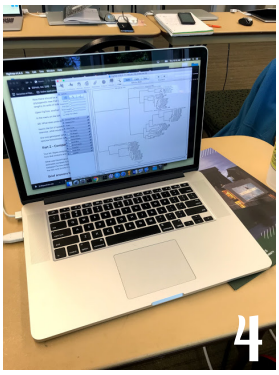
What has happened since I returned to the states?

Well, myctophids contained about 300 nanograms per grams (wet weight) of cadmium. Considering this is such a little animal, is quite a bit, but it seems that our main suspect is the octopus. I am still working out what all these means, but I hope we will be able to identify the real implications of our results very soon.

The course gave much more confidence. It also gave me different tools to help me to look at my data and definitely, it broadened my scientific mind and enriched my brain with fresh and new ideas (not sure if the later is good for an excitable PhD student that needs to focus!)

I once more would like to thank you all for the amazing support you have provided me and without which I would have been able to go to the US. I am happy to keep you updated with my progress if you would like me to do so?

Photo gallery



1. Captain Charles Moore (www.algalita.org)
2. Plastic on the beach in California
3. Around Fort Collins
4. At the workshop
5. Social hour
6. After 20 hour travelling, the samples made it to Cambridge