Dear UBRP Supporter,

My name is Olivia Fernflores and I am a rising junior at the University of Arizona in the W.A. Franke Honors College studying Bioinformatics and Molecular and Cellular Biology. I grew up in California to a Canadian mom and Mexican dad and came to the U of A hoping to learn and grow to set myself up for attending graduate school. Being such a large school with a significant undergraduate population, I expected there would be opportunities to get involved in research, but thought they may not come until fairly late in my time here. And in being part of the Honors College, I thought I would get a small-school atmosphere with large-school resources.

While things didn’t necessarily turn out the way I imagined, I have had some amazing opportunities, one of which has been getting involved in research. The summer after my freshman year, I had the opportunity to participate in the Undergraduate Biology Research Program (UBRP), which is only for U of A students. This was an incredible experience, as it kickstarted my research journey and helped me see that research really is something I enjoy. In the spring of my sophomore year, as I continued working in the lab, I decided to take a chance and apply for the Beckman Scholars Program, not really expecting much.

For me, the Beckman Scholars Program would provide a more intense research experience where I would be forced to step out of my comfort zone by presenting my work at conferences and have the opportunity to meet students across the country with a similar passion for scientific research. This inspired me to apply, despite feeling like there would be many much more qualified applicants. When I found out that I was selected, I was really excited, because I felt like I would have the chance to really dive into research in a serious way by getting to focus on a long-term project, meeting other students with similar interests, and having the opportunity to travel for research.

I have been very lucky to be a part of the Gutenkust Lab at the University of Arizona, where we study population genetics. Specifically, my project is to infer the recent evolutionary history of Mus musculus domescitus, the wild house mouse, using genomic data and population genetics software. There are two main parts, which is to infer the demographic history of the population, and then to develop a distribution of fitness effects (DFE) of deleterious mutations in the population. I am using genomic data collected by Harr, B., Karakoc, E., Neme, R. et al. from wild populations of house mice that share, on average, 92% of their genome with the common lab mouse. The primary software I will be using is called dadi, which is a population genetics software developed by the Gutenkunst Group for inferring demographic histories and DFEs of different populations.

The demographic models I will infer will seek to explain the relationship between four populations of Mus muscles domesticus across Europe by providing parameters for size(s), growth rate(s), time period(s) representing the duration of migration events, and any potential inbreeding. The DFEs that I will create are dependent on the demographic model, but DFE analysis is fairly robust to a variety of demographic models, so we should still be able to create an accurate DFE if our demographic inference is slightly off. The idea behind the DFE is that there are many mutations, most of which are deleterious or neutral, with only a few being beneficial. These mutations exist on a spectrum of how deleterious or beneficial they are, with some being completely deleterious, some being completely beneficial, and most falling somewhere in the middle. The DFE shows this distribution and can help us identify specific mutations that are effecting the fitness of a population. By building a DFE for a species that’s so similar to the common lab mouse, which is a model organism, we hope this work will get us a step closer to understanding the biological basis (if there is one) of the DFE.

Moving forward, I think the experience of working on this research project will be extremely impactful for me, both on a personal and academic level. I had the opportunity to attend my first conference earlier this summer (Evolution 2023), and it was an incredible experience. Slightly intimidated by quantity and quality of research being presented, I found the first day hard, because the only people I knew were the two other members of my lab who attended and I didn’t understand a lot of the presentations. But by the last day, I found myself attending talks on my own, asking questions, and seeking out conversations with people from specific projects that interested me, even though most of them were Ph.D. students or more advanced. Nothing could have prepared me for that experience, but it was so much fun and I will remember if for a long time. I have found that I really enjoy the inquisitive nature of research and exploring the unknown. Some of my favorite times so far have been during lab meetings when we’re discussing something that didn’t go to plan and need to figure out why and how to move forward. There’s something about solving the mystery of a problem that makes it just as enjoyable for me as when something goes to plan (which is almost never!).

Through my time in the lab, I’ve been able to do so many cool things that connect the topics of my molecular biology and genetics classes to the skills I’ve learned in my information science (mostly programming) classes, which has been amazing. Prior to this experience, if you had told me I would learn to use a simple, fairly standard programming concept like Python arrays to store genetic information, I would have thought you were crazy. But now, things like that are part of what I do everyday, which I think is incredible! I never would have learned how to do that, or even that it was possible, from any of the classes in the curriculum for my majors. Not only has working in a lab doing research been an incredible experience itself, but it has also enriched my experience in my classes, which has been very valuable, so much so that I can no longer imagine being an undergraduate student without doing research.

On a more personal level, getting involved in research has helped me find a place where I can be comfortable and confident in my interests. In research, I’m no longer the odd one out for being endlessly curious about everything. I’ve found a place where it’s perfectly normal to enjoy problem solving just as much as success. And most importantly, I’ve found a place where I feel like I can be myself and thrive under the pressure of achieving high academic standards while simultaneously trying to do answer questions that nobody knows the answer to. Being involved in research has been one of the highlights of my time in college thus far and I cannot wait to see what it brings in the future. Thank you so much for your generous support that makes it possible for students like me to have these experiences!

Sincerely,

Olivia Fernflores

[oliviafernflores@arizona.edu](mailto:oliviafernflores@arizona.edu)