I have extensive scientific research experience, and I have participated in computational, molecular, and field-based research projects in Ecuador, Malaysia, and the United States. Each of my research experiences taught me to pose novel scientific questions, to successfully address them, and to write up and publish my findings. Conducting research has helped me develop the collaborative skills, work ethic, and curiosity that are required of successful scientists, as well as the desire and ability to widely disseminate my research findings. I am well-prepared for graduate school, and I will utilize the skills I have gained from previous research experiences to accomplish the doctoral dissertation I am proposing.

Undergraduate Research: André Cavalcanti's Bioinformatics Lab, Pomona College

Although my work in Dr. Cavalcanti's lab was my first significant research experience, I immediately began to work independently on my own project and to be responsible for my own work. I joined the lab as a sophomore and spent one semester conducting a literature review in order to develop a project proposal. I then proposed to use computer programming to investigate patterns in the genomes of two ciliates, single-celled organisms that are used as model organisms for important biomedical research. I received a Howard Hughes Medical Institute research grant to conduct this research the following summer, and I completed my proposed project by the end of the summer. I published two articles in peer-reviewed journals based on this work [2,3].

The following summer I received a Rose Hills Foundation Summer Science and Engineering Research Grant to begin my next project: the creation of a web-based, automated search algorithm to identify putative fusion genes in eukaryote genomes. Fusion genes form when separate genes are joined by genetic recombination, and their identification has important implications for the study of phylogeny and genome evolution. However, very few gene fusions have ever been identified in eukaryotes. Within a week of finishing the first prototype of the algorithm, I identified a putative gene fusion in a ciliate's methionine salvage pathway; the proper functioning of this pathway is essential for preventing many human cancers. Other students in the Cavalcanti lab have since employed my program to identify putative fusion genes in five other eukaryotes, including *Giardia lamblia* and the pathogen that causes Sudden Oak Death. When testing is completed, the automated search algorithm that I helped create will be available online so that it can be utilized globally by other researchers.

My work in Dr. Cavalcanti's lab has directly prepared me for the dissertation project I am proposing to undertake. I have experience identifying patterns in large datasets, analyzing phylogenies, and creating databases and functional web-based tools.

Undergraduate Research: Cristina Negritto's Molecular Biology Lab, Pomona College

For my Senior Thesis in Biology, I completed a functional characterization of the first fusion gene my search algorithm identified, a fusion gene in a ciliate's methionine salvage pathway. Under the supervision of Dr. Cavalcanti and Dr. Negritto, and with the help of a Goldwater Scholarship, I learned the experimental techniques necessary for my project, including growing yeast and *E. coli* cultures, creating growth curves, running PCRs, and carrying out restriction digests, ligations, and transformations.

Our results elucidate a previously unknown characteristic of fusion proteins: They can serve as biochemical shortcuts, allowing organisms to completely bypass steps in biochemical pathways. For my research, I earned the Vaile Prize, awarded to outstanding students in biology, and the John Stauffer Prize for Academic Merit in the Sciences at Pomona College. Our work was recently published in *PLoS Genetics* [1].

Research Assistant: Tiputini Biodiversity Station, Quito, Ecuador

In the midst of conducting my bioinformatics and molecular biology research, I had the opportunity to step out of the laboratory and into one of most biodiverse regions on Earth. I spent one semester studying comparative ecology and conservation in Ecuador. As part of my program, I spent five weeks in the Amazon rainforest working as a research assistant for an ongoing National Geographic-funded camera traps project that is documenting the density of threatened mammals. I worked to develop a database to catalog thousands of photographs, and in one month I finished a portion of the project that had been projected to take up to one year. I also helped maintain cameras positioned throughout the forest. In addition to cementing my desire to conduct environmental research, this was an extremely valuable opportunity because I was able to work as part of a team implementing a large-scale field project.

Graduate Research: Matthew Potts' Ecosystem Management Group, UC Berkeley/Malaysia

As a Hispanic and Chaldean American I received a Berkeley Edge Summer Fellowship to begin work in Dr. Potts' lab the summer before starting graduate school. I spent the first month working with Dr. Potts on a modeling project that aims to improve the timber harvesting planning methods for forests in Peninsular Malaysia. The following month, I assisted with carbon sequestration and ecosystem function field studies in the Perak Integrated Timber Complex in Malaysia. I also participated in a national workshop at the Forest Research Institute of Malaysia, where I developed working relationships with timber concessionaires, government officials, and representatives from WWF Malaysia and the Malaysian Nature Society.

In Malaysia, I gained additional research experience, but more importantly, I learned what it takes to conduct international research that will actually change policy. I gained invaluable insight into how essential it is that academic researchers work directly with private landowners, indigenous groups, governmental organizations, and NGOs to improve our knowledge of and ability to carry out responsible international land stewardship.

I am currently beginning work on my proposed dissertation project: understanding how anthropogenic disturbance affects the relationship between biodiversity and ecosystem services. I am also mentoring three undergraduates in my research group, including two women who belong to ethnic minorities, as they develop independent research projects.

Publications

1. **Salim, Hannah M.W.,** Maria Cristina Negritto, and Andre R.O. Cavalcanti. 2009. 1+1=3. A Fusion of 2 Enzymes in *Tetrahymena thermophila*'s Methionine Salvage Pathway Creates a Trifunctional Enzyme that Catalyzes 3 Steps in the Pathway. *PLoS Genet* 5(10): e1000701. doi:10.1371/journal.pgen.1000701

2. **Salim, Hannah M.W.**, Karen L. Ring, and André R.O. Cavalcanti. 2008. Patterns of codon usage in two ciliates that reassign the genetic code: *Tetrahymena thermophila* and *Paramecium tetraurelia*. *Protist* 159: 283-298.

3. **Salim, Hannah M.W.** and André R.O. Cavalcanti. 2008. Factors influencing codon usage bias in genomes. *J. Braz. Chem. Soc*. 19: 257-261.