

Harisa Spahic

**Graduation Year:** Senior

**College:** Science

**Major(s):** Biochemistry

**Minors(s):** Anthropology; Science, Technology, & Values

**Scholar Group Membership:** QuestBridge Scholars and Fighting Irish Scholars

**Did you received other funding for this project?:** No

**Could you have completed this project without CUSE funding?** No

**More details on CUSE funding assistance?**

**Project Title:** Characterizing Supercharged YKB

**Project Location:** University of Notre Dame

**ND Faculty Mentor:** Dr. Patricia Clark

**Project Type:** Research, Eagan Fellowship

**Why did you undertake this project/experience?** Deepen your knowledge of a topic or issue, Research/experience necessary for senior thesis or capstone project, Prepare for professional school (MD, MBA, JD), Prepare for national fellowships, Career discernment and/or preparation

**Did your funded experience help you:**

**[Deepen your understanding of your coursework or field of study]:** Very Much

**[Discern your interests and post-bac goals]:** Very Much

**[Become confident in your ability to set and achieve your goals]:** Very Much

**[Gain a more nuanced view of local, national, or global communities]:** A Little

**[Improve your written and verbal communications skills]:**Very Much

**Tell us about your experience.**

Over the summer, I spent a majority of my time creating the protein YKB+. This protein derives from YKB which is a multi-domain protein derived from green fluorescent protein (GFP). I was tasked with creating YKB+ because YKB is an aggregate prone protein. The literature and previous work done in our lab indicated supercharging YKB (making it more charged to promote more favorable interactions with the solution) would decrease aggregation. Due to complications in the construction of this protein, a majority of the summer was spent altering the DNA to obtain a functional gene for the protein. These complications produced many unexpected questions to arise regarding the gene which allowed us to rectify the situation and produce two different yet viable versions of YKB+. This upcoming year, I will be working with another undergraduate to characterize these two constructs of YKB+ in relation to YKB and in relation to one another. Though frustrating, this summer experience has taught me the value of patience and flexibility while working in the laboratory. I had planned to complete more analysis than I had and only produce one variant of YKB+; however, my work took longer than expected and I finished the summer with two variants of YKB+.

In addition to constructing YKB+, I was working with supercharged GFP proteins to elucidate the

behavior of this family of supercharged proteins in variable types of solutions. My work with these molecules consisted of characterization of the proteins in variable solutions based on the literature, and parallels what I anticipate doing with YKB+ in the upcoming year. Working on this project alongside creating YKB+ was beneficial during my summer as it allowed me to conduct some analytical work that will benefit the analytical work I will conduct with YKB+ in terms of optimizing experimental procedures and directions for future research.

Lastly, I worked with Dr. Clark to incorporate science visualization projects in an introductory biochemistry course. These projects are designed to allow students to visualize biochemical projects such as an acid-base titration curve to promote deeper and more meaningful understanding. We worked together to craft guidelines and example projects that most effectively allow the students to complete the tasks correctly and with a significant amount of freedom. This experience has been beneficial as I have been able to translate the skills I gained in completing these projects to my upcoming coursework and approach the research I was doing in tandem with my benchwork from a new and unique perspective.

**Describe the impact this project had, both on you as a student-scholar and on the people you worked with.**

This project allowed me to do science as a full time position. I was finally able to experience what it was like coming in every morning, staying for 8-10 hours, and participating in the activities of graduate students. I learned innumerable skills necessary to technically carrying out my experiments, working in a team environment, and responsibly utilize my time due to the substantial amount of independence granted. Furthermore, this project allowed me to learn more about a topic I am heavily interested in: protein folding. It was a fantastic experience being able to devote my time almost exclusively to my research objectives.

This project was also beneficial with regard to the individuals I worked with in the lab by being an additional member of the lab that can provide commentary and suggestions to another lab member's work to help them and the entire laboratory.

**Describe how this experience is connected to your plans as a student or future professional.**

I am currently in the process of applying to medical school and the Rhodes and Marshall Scholarships. I hope to become a physician scientist through these opportunities; however, my experiences researching as an undergraduate have been indispensable in my future plans. Doing research has been fulfilling because it satisfies an innate curiosity and allows me to contribute to society in a unique fashion. These experiences have solidified my desire to become a physician who partakes in research to be able to continue making this impact and doing something I am passionate about.

Specifically, this past summer has been instrumental in developing my skills with regards to basic science research, a crucial foundation to medicine. The experience has also prepared me to pursue further research endeavors through the Rhodes and Marshall Scholarships to continue building these skills to utilize in my future profession.

**What advice would you give other students who are planning to pursue similar projects?**

Be willing and ready to ask for help. Research is not as simple as it seems nor as intimidating as it may seem. I have learned through my experiences that research is truly a team-based effort wherein the lab you are a part of is an amazing support system to ensure your research is the best it can possibly be. Those are you are great resources so be sure to utilize them as they are always happy to help.

Take ownership of your work. You must be willing to ask for help but a large component of research is responsibility. You must take the initiative to design experiments (even after countless failures), work a little extra each day, and familiarize yourself with the literature of your research area.

I acknowledge that this form has been filled out truthfully and to the best of my ability. I understand that this information will be shared with many different CUSE constituencies. As such, I have provided as much useful information as I was able. I understand that CUSE will not complete my award disbursement until this form is successfully completed. If I have any questions or concerns, I will contact CUSE before submitting this form. To illustrate that you understand all of these points, please enter your Notre Dame email in the box below.

Harisa Spahic

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