

Fort Lewis College Undergrad Researcher Aims to be First in Family to Complete High School, College, and Grad School

The road to research was a winding one for Bella Liffick, a Cellular & Molecular Biology major (Chemistry minor) at Fort Lewis College. Originally from the suburbs of Colorado located between Denver and Boulder, Liffick became the first in the family to graduate high school and went on to attend the University of Colorado. But when the COVID-19 pandemic occurred, Liffick's plans, like so many others, took a turn. In-person classes were impacted due to health precautions and online classes were not an appealing option. So Liffick decided to make a change, stepping away for a time and moving to Durango. The town felt comfortable, and when the time was right, Liffick transferred to Fort Lewis College to continue studies and explore research.

"I have been interested in pursuing research for quite a while," shared Liffick, "but I couldn't because I had to work a food service job. The Beckman Scholars program seemed like a wonderful way to gain research experience and get paid for it!" Liffick's research focus is plant genetics. In the lab of Dr. Keisha Carlson, the work involves mapping genotype to phenotype in the model plant, *Arabidopsis suecica*, a polyploid

organism which displays highly varied phenotypic responses to drought in two of its successions, sue 1 and sue 16. Each researcher in the Carlson lab conducts work on a specific variety of target genes, and Liffick's are LTP3 and LTP4, stress response genes. Deleting LTP3 and LTP4 in CRISPR-created clones has enabled observation of the response.

"There are so many things I love about the work that I do. One of my favorite elements of pursuing research is the opportunity to fail. I know that sounds quite silly, but I believe we learn just as much from the experiments that go wrong as we do from the experiments that go right," explained Liffick. "For example, the first two generations of my cloned plants were found to be unmutated but contained the Cas-9, indicating that the CRISPR process should have worked. This setback led us to look back at the guide RNAs we were using and completely redesign them. This setback also opened the door to asking more questions about the nature of polyploid plants and their gene repair response. The work I am doing is indescribably fulfilling, and I am beyond grateful to have been granted this opportunity by the generosity of the Arnold and Mabel Beckman Foundation."



Above and below: 2023 Beckman Scholar Bella Liffick. Photo credit: Fort Lewis College





*Above: 2023 Beckman Scholar Bella Liffick works in the lab of BSP Mentor Dr. Keisha Carlson at Fort Lewis College.
Photo credit: Fort Lewis College*

That gratitude extends to the mentorship aspect of the research experience as well, particularly because it helped with getting a foot in the door of research in the first place. Guidance is the lead reason Liffick feels fortunate to work with Dr. Carlson, who has provided navigation through the research process, taught foundational techniques in microbiology, helped develop problem-solving skills, and more recently, offered advice on pursuing a graduate degree. While it may have been a winding path to the start of

Liffick's research career, the path ahead appears clear and direct: Continue the plant model research originally started as a Beckman-funded project, graduate in 2025, and pursue a PhD program in the years that follow. Liffick has already started the process of seriously looking into schools and programs, carefully weighing options just like for undergrad education during the outbreak of the pandemic.

The search is on for a program that will be a good fit. ■

As a Beckman Scholar, undergraduate researcher Bella Liffick is mapping genotype to phenotype in a plant model system, mentored by Dr. Keisha Carlson at Fort Lewis College.

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