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Plant Genetics and Evolution: Transgenomics

I conducted my undergraduate research at the University of Wisconsin-Madison under the supervision of Dr. David Baum, who is the Department Chair of the Botany Department, and the Private Investigator of his Plant Evolutionary Genetics Lab. I was involved in the Transgenomic portion of the lab, which is a process that helps us search for species-difference genes. I mainly worked with *Arabidopsis thaliana* that were transformed with random fragments of genomic DNA from *Leavenworthia alabamica*. The location of my research was mainly in The Biotron, a greenhouse on campus and my PI's lab in the campus building, Birge Hall. The broader goal of my research was to detect genes that caused morphological evolution, and which genes cause these visible morphological traits.

My objectives were to see if primary transformants produced any new mutant phenotypes and to confirm lines that had previously contained a mutant phenotype. The specific goal that motivated the exchange was for me to identify whether or not transgenes were responsible for the following lines, 12_03E, 09_09A, and 04_09A, which the following traits.

12_03E: Selected plants had abnormal spacing between fruits.

09_09A: Selected plants had abnormal flowers that were larger in size and had 5 petals.

04_09A: Had 1 selected plant that was a dwarf plant that was farther behind in development with less fruits and more flowers than the normal plants.

Unfortunately, screening for these phenotypes was unsuccessful because these same phenotypes were not detected during the rescreen. There were a few obstacles that appeared during the research that delayed the process including thrip infestation, and molding in soil. Regardless, I was given the chance to screen several lines which produced more results. I screened 30 additional lines and found three lines with visible morphological traits that differed from their normal counterparts. For each line, six unselected plants were planted and six selected plants were planted for control and experiment purposes.

Line 05_11D: All selected plants were smaller in height and were less bushy than their unselected counterparts. There was one evident dwarf plant.

Line 05_05E: Four out of the six selected plants had short fruits compared to the unselected plants. On average, the short fruits were 1cm in length compared to 2cm.

Line 05_09H: All selected plants had longer rosette leaves. The 3 longest rosette leaves were measured from both the selected and unselected plants. The average rosette leaf length of the selected plants were 7.5cm and the unselected plants were 5.1cm.

Unfortunately, my internship ended before I could conduct any molecular work to see whether transgenes were responsible for these phenotypic differences. Many of the techniques that I learned generally worked well. Some of the measurement methods could be improved upon, and the transplanting process had to be modified to be easier. I use more plastic coverings to separate each plant so that they would not get tangled up. Otherwise, my experience in David's lab was very enriching and interesting. I enjoyed my time conducting valuable research and working with an amazing team.