



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Isabelle Do	Project Number S1802
Project Title The Effect of Nuclear-Cytoplasmic Partitioning of AAR2 and HYL1 on microRNA Biogenesis and Plant Development	
Abstract Objectives This experiment is part of a larger study dedicated to finding the exact location of microRNA (miRNA) biogenesis in plant cells. As the location of microRNA biogenesis has not yet been found, nor could be found in the time period this experiment has taken place, this is meant to observe and analyze the effect of nuclear-cytoplasmic partitioning of splicing protein AAR2 and double-stranded RNA-binding protein HYPONASTIC LEAVES1 (HYL1) has on miRNA biogenesis and plant growth, specifically in Arabidopsis plants and cells. It is believed that the subcellular location of AAR2 may be negligible, though it is mainly found in the chloroplast, to the overall biogenesis and plant development process and if HYL1 is sent to the cytoplasm via nuclear export signal, it is postulated to be located in the nucleus, it would disrupt the above processes. One thing that is believed is that if changing the subcellular locations of AAR2 and HYL1 can affect their interactions and functions as proteins, then changing the subcellular locations would also affect the microRNA biogenesis and plant development process. Within several months of experimentation, all the data gathered has led to the conclusion that the partitioning of AAR2 does not seem to affect plant growth, therefore not affect miRNA biogenesis, and the placing the HYL1 protein in the cytosol leads to more consistent development and growth. As the study continues, more data will be able to definitively locate the site of miRNA biogenesis in Arabidopsis cells. Methods Soil, Fertilizer, Agar gel, Electrophoresis gel and analysis. microscope, autoclave, pipettes, a variety of chemicals, incubator, pcr machine Results Signal Type Intensity Protein Number/Type Amount with Significant Growth NLS 2 HYL1 17 1:6 with little to no underdeveloped sprouts	
Summary Statement How changing the location of AAR2 and HYL1 in the cell can affect miRNA density, miRNA biogenesis, and overall plant development.	
Help Received Dr. Xuemei Chen allowed me to work in her laboratory and use her equipment. Dr. Lusheng Fan taught me the procedures required and the correct scientific methods required to complete my project.	