



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Grady Morrissey; Matt Son	Project Number S1910
Project Title A Study of Macromolecule Absorbtion by Plants in a Hydroponics System	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals With concerns about food safety and the exact contents of each bite of produce, it is important to see how plants absorb nutrients. This study examined macromolecule absorption by basil plants in a hydroponics system. Using hydroponics for the scientific model has the advantage of allowing complete control of extraneous variables of interest.</p> <p>Methods/Materials The hydroponics system, a deep water culture, consisted of five bins filled with nutrient reservoir with lids containing plants growing roots down to the reservoir for sustenance. Two of the five bins were filled with plain nutrient solution as controls, while the other three experimental bins were supplemented with either glucose, starch, or lipids. This study used macromolecule indicators in a semi-quantitative test, which was used to determine the relative concentration of a macromolecule in different solutions. By pairing control plants with experimental plants at the same dilution, the relative amount of the macromolecule could be found using indicators. After about two months of allowing the plants to grow and absorb the macromolecules, testing began.</p> <p>Results The pairs were tested for the macromolecule fed to the experimental plant in order to find how plants absorb different macromolecules depending on their availability. As expected, the plants fed glucose and starch had higher macromolecule concentrations than their control counterparts, while the plants fed lipids did not absorb more than the controls.</p> <p>Conclusions/Discussion These results are explained by plant nutrient uptake through osmosis, as only water-soluble nutrients are able to pass into plants through water.</p>	
Summary Statement Our study used biological indicators to prove that macromolecule absorption by plants in a hydroponics system is a function of water-solubility.	
Help Received We designed, built, and tested with the help of internet research as well as learning the techniques for the biological indicators from our Biology teacher, Ms. Kaufman.	