



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> Alex L. Nothnagel	<b>Project Number</b> <b>S0421</b>
<b>Project Title</b> <b>Chemical Analysis of Glycosyl Composition of Cell Walls from Lower Land Plants</b>	
<b>Abstract</b> <b>Objectives/Goals</b> What is the glycosyl (sugar) composition of cell walls from lower land plants? Answering this question was the purpose of this project because little research has been done in this area. The hypothesis stated that the glycosyl composition of cell walls from lower land plants would be more like the glycosyl composition of cell walls from dicot plants rather than cereal monocot plants. The prediction was that if cell walls from a variety of lower land plants were extracted and tested for their glycosyl composition, the composition would reflect a greater content of pectin (typical of dicots) than of glucuronoarabinoxylan (typical of cereal monocots). <b>Methods/Materials</b> The methods used to test the hypothesis involved taking leaf tissue from various plants, then grinding it up and extracting lipids, starch, and other materials from the tissue. After that, imidazole and NaOH were used to extract cell wall polysaccharides from the tissue, giving three fractions (imidazole-soluble, NaOH-soluble, and NaOH-insoluble) that could be cleaved to their component sugars and then analyzed by gas chromatography. <b>Results</b> The data revealed that all of the samples had galacturonic acid, galactose, and arabinose, sugars more typical of pectin than glucuronoarabinoxylan. Some of the samples contained an unusual sugar, 3-0-methyl-rhamnose. <b>Conclusions/Discussion</b> The hypothesis was supported because the cell wall contents of the lower land plants were more like dicot cell walls than cereal monocot cell walls. Future work of interest might focus on further study of the occurrence and function of the unusual 3-0-methyl-rhamnose sugar, which is present in at least some lower land plants but seems to have not yet been found in angiosperms, the flowering and most advanced land plants.	
<b>Summary Statement</b> This project is about investigating whether cell walls have changed during the evolution of land plants.	
<b>Help Received</b> Dr. Eugene Nothnagel provided assistance and guidance in the use of laboratory instruments and chemicals.	