



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Bella L. Penza	Project Number J1930
Project Title UnbeLEAFable Chromatography: The Discovery of Hidden Pigments in Leaves	
Objectives/Goals The objective of this experiment is to look at the various pigments in leaves to be able to determine which pigments are more prevalent as the leaves change colors.	
Abstract As autumn approached, leaves from a White Ash, Sumac, and Japanese Maple tree were collected and separated based on their color and the type of tree. Then 2.5 grams of the same leaf color from each tree were used to extract the pigments. The pigments were extracted by mashing the leaves in a mortar and pestle with 2 teaspoons of acetone and 1/8 teaspoon of sand. These extracted pigments were blotted 10 times onto a piece of chromatography paper, letting the paper dry between each application. The chromatography paper with the blotted pigments was placed in a glass test tube with acetone. The acetone solvent was allowed to migrate to within 1/4 inch from the top of the paper. The paper was allowed to dry and the various pigments were identified by comparing them to a control chromatogram. This process was repeated on a separate paper for each leaf color of each tree.	
Methods/Materials As autumn approached, leaves from a White Ash, Sumac, and Japanese Maple tree were collected and separated based on their color and the type of tree. Then 2.5 grams of the same leaf color from each tree were used to extract the pigments. The pigments were extracted by mashing the leaves in a mortar and pestle with 2 teaspoons of acetone and 1/8 teaspoon of sand. These extracted pigments were blotted 10 times onto a piece of chromatography paper, letting the paper dry between each application. The chromatography paper with the blotted pigments was placed in a glass test tube with acetone. The acetone solvent was allowed to migrate to within 1/4 inch from the top of the paper. The paper was allowed to dry and the various pigments were identified by comparing them to a control chromatogram. This process was repeated on a separate paper for each leaf color of each tree.	
Results All of the green leaves contained chlorophylls a and b. As the leaves changed colors chlorophyll b was absent and chlorophyll a began to fade. Xanthophylls were present in all leaf colors of all trees except the dead leaves of the White Ash tree. Anthocyanins were found in the red leaves of the Sumac and the red-orange and red leaves of the Japanese Maple tree.	
Conclusions/Discussion My experimental results supported my hypothesis in that as the leaves changed from green to other colors, the amount of chlorophyll was reduced, xanthophylls were unmasked, and new anthocyanin pigments were formed.	
Summary Statement I used paper chromatography to isolate various pigments in tree leaves to determine why leaves change colors.	
Help Received Parental advice and oversight for the project procedure. Teacher advice was given for format and content.	