# CALIFORNIA SCIENCE & ENGINEERING FAIR
# 2018 PROJECT SUMMARY

**Name(s)**
Ayat A. Alwazir

**Project Number**
**J0501**

**Project Title**
## Vitamin D Survival in the Stomach

**Abstract**

**Objectives/Goals**
The objectives is to determine the best conditions in the stomach for the highest amount of Vitamin D ingested to be readily available to provide the intended benefits. The stomach environment factors tested are its pH as determined by when the stomach is full or empty and, with Vitamin K.

**Methods/Materials**
Soy milk (Vitamin D source), Vitamin K capsules, Distilled water, Distilled white vinegar, Spectrophotometer, UV Spot Machine, Centrifuge, 96 wells assay plates, pH meter

Two environments of the stomach were prepared. Full stomach (pH 4) and less than half full stomach (pH 3). The control was water (pH 7). To one batch Soy milk and Vitamin K was added and to second batch Soy milk was added. They were prepared at different intervals to indicate dissolution rates at 24 hrs, 12 hrs, 8 hrs, 4 hrs and 2 hrs before testing Vitamin D availability from spun down pellet on assay plate read using Spectrophotometer at 296 wavelength determined for Vitamin D.

**Results**
There was more Vitamin D detected in the less than half full stomach. Vitamin K presented fluctuated change in the dissolution rate of Vitamin D in the stomach, despite the various environments presented. The results reveal that it is best to take Vitamin D with a small meal. The Vitamin K and Vitamin D did not work in synergy in the stomach as they do with calcium absorption in the bones.

**Conclusions/Discussion**
Smaller portion bites do allow for higher Vitamin D availability from our meal. Vitamin K in our meal will not affect Vitamin D survival in the stomach.
These dietary habits of realizing new ways to raise our Vitamin D levels in the body to help prevent current high incidences of unexplained Vitamin D deficiencies and resulting diseases.
Further research on other stomach environmental factors as bacteria in the stomach mucosa and optimum fatty diet to contribute in increasing Vitamin D in the body.

**Summary Statement**
To increase the chances of Vitamin D ingested in our food reaching the intended destination to conduct the key benefits.

**Help Received**
Dr. Arwa Kurabi, assistant research scientist at the Department of Surgery Division of Otolaryngology at the UCSD laboratory taught me the assays to perform to be read on different Spectrophotometer machines on the samples that I prepared the procedure for. My teacher also reviewed my results and analysis.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
# 2018 PROJECT SUMMARY

**Name(s)**

**Lakshman S. Athappan**

**Project Number**

**J0502**

**Project Title**

## One Step Closer to Ending Diabetes by Choosing the Right Variety of Rice

**Abstract**

**Objectives/Goals**

My objective is to find the type of rice with the lowest amount of starch for people who have diabetes.

**Methods/Materials**

Materials- Pressure cooker, jasmine rice, basmati rice, parboiled rice, raw rice, sticky rice, cornstarch, tincture of iodine, five 10 ml graduated test tubes, test tube rack, 96 well microplates, 2 small cups, scale with gram measurements, two 0.1-1 ml graduated glass pipettes, computer, printer with scanner, RGB color picker software, gloves, and goggles.

Methods- 1 gram of cornstarch was mixed in 100 ml of hot water. The solution was serially diluted in 5 test tubes. 0.2 ml iodine solution was mixed with 6 ml of water to make an indicator solution. 0.1 ml of each of the serially diluted solutions were added to the 96 well plate in triplicates and 0.2 ml iodine indicator solution was added to each well. The plate was scanned and the RGB data was analyzed for each dilution and made into a standard calibration curve. Quarter cup of rice was cooked with half a cup of water in pressure cooker. 1 gram of rice was weighed, mashed and then mixed in 100 ml of water. 1 ml of rice solution was taken and mixed with 1 ml of water. 0.1 ml of the diluted rice solution was added in the microplate and 0.2 ml of the iodine indicator solution was added. The plate was scanned and the RGB analysis was performed. Then the standard curve was interpolated to find the starch concentration. This was repeated with all rice varieties in triplicates.

**Results**

Several varieties of rice were tested multiple times with the calibration standards to find the one which had the lowest amount of starch. Parboiled rice had the lowest amount of starch followed by millet and raw rice which were all under 13 grams of starch per quarter cup of rice. The other 3 varieties tested had almost 5 times more starch.

**Conclusions/Discussion**

With my experiment, I found how much starch is in different varieties of rice. Switching from sticky rice to parboiled can significantly lower the risk for diabetes. People who do not like to eat parboiled rice every day, can try raw rice or millet, which had comparable amounts of starch. It gives a new taste without too much of starch either.

**Summary Statement**

With my project, I found which variety of rice would be best for people who have diabetes or are prone to having it.

**Help Received**

I would like to thank my mom for teaching me how to make standard calibration curves . I would like to thank my aunt for helpful discussions regarding different cooking methods.

**Name(s)**
Makena Bailey; Kyra Phaychanpheng

**Project Number**
J0503

**Project Title**
# Fruit Forensics: Extracting DNA from Fruits Using Different Cell Lysis Buffers

**Abstract**

**Objectives/Goals**
Our objective is to learn how to extract deoxyribonucleic acid (DNA) from fruits and to determine which fruit yields more DNA and which soap solution helps the fruits precipitate more DNA. We were inspired to extract DNA from different fruits because DNA is in all living organisms. There is also so much to explore about DNA.
Our hypothesis states that strawberries will produce more DNA than the raspberries and bananas, while the dish soap in the Cell Lysis Buffer (CLB) will cause more DNA to be extracted compared to the laundry detergent and shampoo.

**Methods/Materials**
To extract DNA from strawberries, raspberries, and bananas, we need to use a special technique using CLB, which breaks down the cell membrane. We tested three fruits, with three CLBs, three times each. We used strawberries, raspberries, and bananas with laundry detergent, dish soap, and shampoo in the Cell Lysis Buffers. In all we performed 27 tests. We prepared the CLB that is made of water, salt, and our first chosen soap, then we smashed our first fruit into a paste. Next, we mixed 10g of fruit paste and 10mL of CLB together. We strained the mixture through gauze cloth then slowly layer ethanol on top of the fruit/ CLB mixture. As soon as the DNA appeared, we extracted it and put the DNA into centrifuge tubes. We weighed the centrifuge tube with the DNA in it.

**Results**
We found that the raspberries produced the most DNA with an average of 0.21 grams, and bananas produced the least DNA with an average of 0.089 grams. Also, we found that the dish soap caused a greater amount of DNA an average of 0.164 grams to be extracted. For the different soaps in the Cell Lysis Buffer, the dishwashing soap caused the greatest amount of DNA to be extracted from the fruits. Although the dish soap caused the most extractable DNA, laundry detergent was only 0.003g less.

**Conclusions/Discussion**
Our hypothesis was partially supported and partially not supported. Our hypothesis was not supported because we assumed the strawberries would produce more DNA, but raspberries produced more DNA. Our hypothesis was supported because dish soap caused the most DNA to be extracted.
In conclusion, we learned more about DNA and how it is essential for all living things. We also learned a procedure and techniques how to extract DNA. This experiment will help others (and us) to understand more about genetics and biotechnology.

**Summary Statement**
We extracted DNA from strawberries, raspberries, and bananas using different soaps in the cell lysis buffer.

**Help Received**
None. We performed the experiments ourselves.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Kirin K. Bhasin

**Project Number**
**J0504**

**Project Title**
## Turning Up the Heat on Hydrogen Peroxide

**Abstract**

**Objectives/Goals**
The objective of my project was to learn at what temperture does catalase break down hydrogen peroxide most efficiently.

**Methods/Materials**
Timer, Potato and Potato Peeler, Filter paper, Hydrogen peroxide, Tweezers, Water/ice cubes, Beaker/test tubes, Cylinder tubes, Funnel, Bowls(for water), Cheese cloth, Weighing scale, Blender, Kettle/stove, Thermometer.

**Results**
From my experiment I learned that at 37 degrees celsius, normal body temperature, the catalase breaks down the hydrogen peroxide at the fastest rate.

**Conclusions/Discussion**
While doing this experiment you learn how temperature affects the reaction rate of hydrogen peroxide and catalase when reacted together. The hypothesis that I stated was correct, which said that if the temperature is 37 degrees celsius, normal body temperature, the reaction between hydrogen peroxide and catalase would be the fastest. During my experiment as temperatures went up the reaction time continued to decline, but when the temperature went higher than 37 degrees Celsius the reaction time rose back up again thereby proving my hypothesis. The data collected could have been more precise if laboratory conditions and equipment were used verses my homemade lab. The reaction that occurs is called a substrate enzyme reaction which means that the enzyme hooks on to a substrate and then goes into the process of breaking it down. The hydrogen peroxide is the substrate, and the enzyme is the catalase together producing water and oxygen. The data shows the ideal temperature for catalase is body temperature, this works out perfect for the human body because when humans begin to build up too much hydrogen peroxide it needs to be broken down, or else it could damage cells. Amazingly, we produce hydrogen peroxide, use it, and decompose it and all three are essential to our health.

**Summary Statement**
In my experiment, at body temperature catalase decomposes hydrogen peroxide at the fastest rate, which is essential to our bodies.

**Help Received**
I required help from my parents with the heated pot, but I preformed the testing on my own.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
# 2018 PROJECT SUMMARY

**Name(s)**

**Skyler E. Burlison**

**Project Number**

**J0505**

**Project Title**

## Testing Genetic Diversity of Sequoia sempervirens from Three Locations

**Abstract**

**Objectives/Goals**

The objective of my project was to figure out if Sequoia sempervirens, also known as coast redwood trees, from different locations were genetically diverse in one microsatellite region of their DNA. This is important because if the trees do not have genetic diversity and climate change is bad for them, it may harm all of the trees. If coast redwoods do have genetic diversity then if something is bad for one tree it might not be the same for others. My hypothesis was that I would find genetic diversity between samples from three different locations.

**Methods/Materials**

In my experiment, I collected two needle samples from coast redwood trees from three different locations: Sunny Brae Community Forest, Arcata Community Forest, and Lady Bird Johnson Grove. I then isolated the DNA using a QIAGEN DNeasy plant mini kit. Next, I performed the Polymerase Chain Reaction with all six samples and ran gel electrophoresis so I could compare the base pair size of the samples from each location.

**Results**

When I analyzed my gel electrophoresis results, both samples from the Sunny Brae Community Forest and both samples from the Arcata Community Forest samples had bands at 160 base pairs, while both samples from Lady Bird Johnson Grove showed bands at 176 base pairs.

**Conclusions/Discussion**

My results did not support my hypothesis. I thought there would be genetic diversity in one microsatellite region between samples from all three locations. Instead, Sunny Brae Community Forest trees and Arcata Community Forest trees were not diverse, but Lady Bird Johnson Grove trees were diverse from the other two. This is good because genetic diversity can help species survive. While this was only a small number of base pairs out of the 30 billion base pair genome, hopefully it is an indication of diversity within the species.

**Summary Statement**

The objective of my project was to figure out if Sequoia sempervirens from different locations were genetically diverse in one microsatellite region of their DNA.

**Help Received**

I performed my experiment at Humboldt State University using supplies and equipment that were donated by the Biological Sciences Department. I was mentored and supervised by my dad.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Bianca Demarchi

**Project Number**
**J0506**

**Project Title**
## Avocado Oxidation

**Abstract**

**Objectives/Goals**
The objective of this study is to determine which method of avocado storage results in the least amount of avocado oxidation.

**Methods/Materials**
15 avocado halves (some with pits left intact), lemon juice, olive oil, and plastic wrap. Observed discoloration (i.e. oxidation level) of avocados treated with various substances to compare the most effective method to prevent oxidation over a period of a couple days.

**Results**
I observed the discoloration of avocado halves (pits removed) treated with lemon juice, olive oil and plastic wrap along with untreated avocado halves with pits left intact. The comparison showed that the avocados with pits resulted in the least oxidation and discoloration.

**Conclusions/Discussion**
The pit method (leaving the avocado pit intact) was most efficient at keeping the avocado from discoloring and oxidizing. This is most likley because the pit was already airtight and embedded into the avocado naturally with less overall exposed surface area to oxidize. Although I had thought that the plastic wrap treatment would result in the least amount of oxidation, those avocados ended up with more or less the same level of discoloration as the lemon juice and control group.

**Summary Statement**
I found that leaving an avocado pit intact will result in the least the amount of avocado oxidation compared to other treatment methods.

**Help Received**
I designed and organized the avocado experiment by myself. My teacher and research helped me to decide which variables I might try to prevent oxidation. My mother helped me slice and organize the avocados for observation.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Nathan S. Gomez

**Project Number**
**J0507**

**Project Title**
## Biomass to Biogas

**Abstract**

**Objectives/Goals**
My problem statement is "Does temperature affect the production of biogas when starting with the same quantity of biofuel?" I hypothesize the floating drum exposed to the most heat will create the most methane in the shortest time. This is because e.coli is more active in warmer temperatures, which results in more biogas.

**Methods/Materials**
I built four floating drums using plastic bottles of assorted sizes. These floating drums provide a method for accurately measuring the amount of gas produced. Then I filled three floating drums with cow manure. I controlled the temperature of the biomasses by placing the drums on a wire rack at different distances from an electric heater. Twice daily, I used an infrared thermometer to measure the temperature of the floating drums and a square to measure the change in height. I repeated these measurements over the course of twelve days. I also placed a control drum which contained only water at the highest temperature to determine if water vapor was being produced and skewing the results of my experiment.

**Results**
The floating drum exposed to the highest temperature (95 degrees) produced the most biogas (approximately 300 cubic centimeters of methane.) As the temperature decreased, the amount of biogas produced declined. In my experimental trials, the drum held at 70 degrees F did not produce any methane, whereas the hottest drum produced about six times as much methane as the vessel held at an average temperature of 79 degrees F. The control drum showed no change in height which indcates that water vapor was not produced at a measureable quantity that could influence my data and that the change in volume of the other floating drums could be attributed to the production of methane.

**Conclusions/Discussion**
My hypothesis was correct. In twelve days, the floating drums showed that the highest temperatures produced the most biogas. According to my data, the hotter the floating drum, the quicker methane gas gets produced. For organizations such as the El Sobrante Landfill, which produce and distribute this biofuel, understanding the environmental conditions that influence the rate and volume of gas production will greatly improve their efficiency. They can use this information to reduce the amount of time it takes for them to convert the organic trash into useable fuel.

**Summary Statement**
My experiment showed that temperature greatly impacts the rate at which biomasses are converted to biogas when working with manure and e.coli

**Help Received**
I designed the floating drums based on a large scale diagram I found in my online research. Interviews with biochemists Dr. Boyer and Dr. Moellers along with UCLA Phd candidate Chung Won provided background on the basics of the reaction and environmental parameters required to keep e.coli alive.

**Name(s)**
Janae E. Hutson

**Project Number**
**J0508**

**Project Title**
# The Accuracy of Reported Invisible Fat in Foods

**Abstract**

**Objectives/Goals**
In my experiment, I extracted the invisible fat from foods such as potato chips, chocolate chips, and almonds and compared that value to its label to see which food had the most inaccurate amount of invisible fat extracted. My objective of this study is to determine whether food manufacturers lied on their labels to make their food seem healthier than it is so they could cultivate more money, so I created a question of, "Which snack will have the most inaccurate amount of invisible fat extracted compared to its label?", to help dictate whether my prediction was true or not.

**Methods/Materials**
My hypothesis was that almonds would have the most inaccurate amount of invisible fat extracted compared to its label. 20mL of acetone was added two times, per jar to dissolve the fat from the snacks. After that was completed, the acetone and dissolved fat in the mason jars were set out in the sun for 24 hours so the acetone would evaporate. That then left behind the invisible fat in the jars.

**Results**
On an average scale, potato chips had a decreased value of -0.2g of fat from its label, almonds has a decreased value of -1.2g, and chocolate chips had a increased value of +6.4g.

**Conclusions/Discussion**
Chocolate chips had such a greatly increased value because of a chemical component called Lecithin in it that prohibits the fat from separating from the food, thus making the results of the chocolate chips have an inaccurate value of fat extracted. Therefore, my results showed that chocolate chips had the most inaccurate amount of invisible fat extracted compared to its label, which contradicted my hypothesis.

**Summary Statement**
I extracted the invisible fat from foods such as potato chips, chocolate chips and almonds and discovered that chocolate chips have the most inaccurate amount of invisible fat extracted compared to its label because of a chemical additive.

**Help Received**
I constructed and performed the experiment by myself after some research on the materials and procedures on the Science Buddies website.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Taekyeong Jeong

**Project Number**
**J0509**

**Project Title**
## In What Ratio Are Genes Passed On?

**Abstract**

**Objectives/Goals**
The objective of this study is to determine the ratio of how genes are passed on and how often they physically appear in the offspring.

**Methods/Materials**
Wild type male C. elegans (roundworm), unc-3 mutated hermaphrodite C. elegans, rol-6 mutated hermaphrodite C. elegans, petri dish with NGM culture media, dissecting microscope, picker, incubator. Bred male wild type worms with a mutated hermaphrodite worm, counted phenotypes of offspring, allowed hermaphrodite offspring to self-fertilize, and counted phenotypes of the second generation of offspring. Conducted twice, once with unc-3 mutation and once with rol-6 mutation.

**Results**
The first generation of the unc-3 mutated hermaphrodites' offspring all showed wild type phenotypes, and the second generation showed a 1:3 phenotypic ratio of unc-3 to wild type. The first generation of the rol-6 mutated hermaphrodites' offspring all showed rol-6 phenotypes, and the second generation showed a 3:1 phenotypic ratio of rol-6 to wild type.

**Conclusions/Discussion**
The unc-3 mutation is recessive, while the rol-6 mutation is dominant, and it is possible to find the characteristics (dominance or recessiveness) of a gene through the phenotypes of heterozygotes with those genes.

**Summary Statement**
I conducted an experiment to find a pattern of how genes are passed.

**Help Received**
I used lab equipment in Rothman Lab in University of California, Santa Barbara under the supervision of Dr. Jeong.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Anusha Kadiyala

**Project Number**
**J0510**

**Project Title**
# Determining Gene Dominance in Polygenic Traits

**Abstract**

**Objectives/Goals**
Understanding Gene Dominance is critical for gene therapies like gene knockout or gene editing using CRISPR. Millions suffer from diseases like Diabetes, Hypertension and Coronary Heart Diseases which are polygenic diseases meaning more than one gene contributes to the disease. Further only a single allele of a sex-linked recessive trait is sufficient for the recessive trait to express itself. When multiple recessive genes affect a single trait, I hypothesize that the Hemizygous Recessive Gene (X-Linked) will be more dominant than the Autosomal Recessive Gene. In this project a novel method is proposed to determine the relative dominance of X-linked polygenic recessive traits.

**Methods/Materials**
For this project, Drosophila (fruit fly) is used to study dominance of Polygenic recessive genes. In this project, two independent polygenic traits - Eye Color and Wing Size - are used to draw conclusions on dominance between Hemizygous and Autosomal Recessive Genes. The proposed method relies upon breeding Drosophila with a percentage of population distribution that will be recessive for both traits. By observing the resulting phenotype we can draw conclusions on the dominant gene.

**Results**
For the eye color trait, a total of 356 males were examined of which 25.28% were Red Eyed as expected, 25% was Sepia Eyed and 48.31% was White Eyed implying that the hemizygous-recessive white eye color gene is more dominant than the autosomal-recessive Sepia Eye Color gene thereby supporting the Hypothesis. For the wing size trait, a total of 261 males were examined of which 35.58% is Long winged, 31.75% is Miniature winged and 39.18% is Apterous type implying the autosomal-recessive Apterous Wing gene is more dominant than the hemizygous-recessive Miniature wing gene thereby rejecting the Hypothesis.

**Conclusions/Discussion**
Based on the experiments conducted, I conclude that X-Linked genes are not automatically more dominant than their autosomal counterpart and that the theory of dominance should be based on gene interaction rather than its physical location in the Karyotype. This project establishes a successful methodology for determining dominance of polygenic recessive genes.

**Summary Statement**
A method is proposed to determine relative dominance between a Hemizygous recessive gene and an Autosomal recessive gene affecting a polygenic trait.

**Help Received**
I got initial guidance to use Drosophila from Mr. Teachworth. My science teacher Mr. Carmichael helped me procure lab materials from Carolina Biologicals. Mr. Daniel Zhang guided me on project presentation. My parents assisted with data collection & analysis. I am grateful to all of them for their support.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Jack T. Medhurst

**Project Number**
**J0511**

**Project Title**
## Preventing Scurvy with Vitamin C

**Abstract**

**Objectives/Goals**
The objective of this study was to measure the content of Vitamin C in different conditions of fruits (dried, canned, and fresh) and determine which had the greatest content.

**Methods/Materials**
At least one condition of each fruit: pineapple, apple, orange, mango, kiwi, pear, peach, apricot, tincture of iodine, starch, eye dropper. Used iodine to oxidize and measure the juices of the fruits.

**Results**
Several juices from different fruits of varying conditions were extracted and their vitamin C content measured using the oxidation process of tincture of iodine. The fresh fruits were proven to have the greatest content and the dried fruits were proven to have the least.

**Conclusions/Discussion**
The procedures with the iodine, starch, and juices revealed that dried fruits indeed had the least content of vitamin C out of the three conditions. It was concluded that the African scurvy epidemic is caused by the diet fo dried fruits over fresh or canned ones.

**Summary Statement**
I determined that dried fruits have the least amount of vitamin C and that fresh fruits contained the greatest, and that African scurvy is caused by dried fruits.

**Help Received**
None. I designed the experiment and procedures myself. I performed the experiment alone.

**Name(s)**
Zaighum R. Nagra

**Project Number**
J0512

**Project Title**
# Effectiveness of Home Remedies Used for Lowering Cholesterol

**Abstract**

**Objectives/Goals**
This study examines the question of difference in efficacy of digesting beef fat by three home remedies commonly used for lowering cholesterol levels in blood.

**Methods/Materials**
The efficacy of Apple Cider Vinegar, Honey Garlic Paste and Coriander Juice is investigated using beef fat as substrate, in controlled laboratory environment. Equal amount of the test remedies are incubated at 37 °C with measured amount of beef fat. Ethyl Alcohol is used as positive and Distilled Water as negative controls. The amount of digested/disintegrated fat is measured and texture of the digest is noted. The experiment is repeated 3 times.

**Results**
Apple Cider Vinegar digested the most fat, an average of 1.07 grams (5.35%), while Coriander Juice digested the least at only 0.18 grams (0.9%). Honey Garlic paste digested 0.39 grams (1.95%). In comparison, the positive control digested 1.86 grams (9.3%) and negative control digested nothing. Honey Garlic paste thickened the most.

**Conclusions/Discussion**
The results suggest that Apple Cider Vinegar is the best to naturally digest/disintegrate fat, which is the major source of cholesterol in daily diet. Apple Cider Vinegar could be the best of the three tested commonly used home remedies to lower cholesterol.

**Summary Statement**
Apple Cider Vinegar could be the best home remedy to control hypercholesterolemia.

**Help Received**
Initiated, discussed and completed the project at the UCLA-CURE Digestive Diseases Research Center laboratory under the supervision of Lixin Wang, MD, PhD.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Travis H. Nguyen

**Project Number**
**J0513**

**Project Title**
# The Effect of Invertase and Drink Type on a Drink's Glucose Concentration Level

**Abstract**

**Objectives/Goals**
Goal:

I wanted to learn if sucrose, also known as table sugar, can be converted into glucose during the human digestion process.

**Methods/Materials**
Materials/Methods:

Invertase, Gatorade, Arizona Tea, Sunny D Juice, Coke, Glucose test strips, sucrose, graduated cylinders, disposable plastic cups, measuring spoons, pipettes. I took a sample of a drink's glucose level to determine the amount of glucose already present. Next, I added 0.5 milliliters of invertase to 15 milliliters of the drink, and waited 20 minutes, which was the linear time point. I repeated this step 44 more times for each drink. To determine the linear time point, I divided the time it took settle by 2.

**Results**
Results:

The results showed that the more sucrose that was present in the drink, the more sucrose was converted into glucose after adding invertase. The drink with the most amount of sucrose (Coke), had an 80% increase in glucose concentration level, from 1%, to 1.8%

**Conclusions/Discussion**
Conclusion:

My hypothesis was supported by the data because the results have shown that the drink with the most sucrose had the largest increase in glucose levels. One problem I had was that the glucose strips were still changing colors. If I did this project again, I would use a digital blood glucose monitor. People with diabetes can find out which foods are safe to moderately consume by determining the amount of glucose in the food in order to keep their blood sugar at an appropriate level. They can also be aware that they will be digesting even more glucose than what the food originally had.

**Summary Statement**
Summary Statement: Invertase is a type of enzyme I used in order to simulate the human digestion process to determine if sucrose can be converted to glucose during the human digestion process.

**Help Received**
I tested and analyzed the data myself. My Science teacher reviewed my results.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Uzair Sajid

**Project Number**
**J0514**

**Project Title**
## Unveiling the Hidden Culprit: Sugar

**Abstract**

**Objectives/Goals**
The purpose of this project is to analyze how the enzyme invertase converts sucrose into glucose and how this affects the amount of actual glucose digested from different foods.

**Methods/Materials**
Used graduated cylinders, invertase solution, glucose powder, graduated transfer pipettes, stop watch, and urinalysis test strip that measure glucose. Tested different foods (pancake syrup, tomatoes, potatoes, Oreo ice cream, baby food (blueberry banana), tangerines, mango juice, ranch dressing, and Pepsi soda) for glucose concentration before and after adding invertase at the linear point time, which was determined from invertase testing activity. Three different samples of each selected food were tested to ensure accurate results.

**Results**
The data supported the hypothesis that Pepsi will contain the highest amount of glucose concentration after adding the invertase. Pancake syrup also matched Pepsi's concentration of 1.5 % on the urinalysis glucose strip. Since these samples along with other sugary foods were diluted 10 fold, the actual glucose concentration in the sample is 15%. Next in line was mango juice with 7.5% concentration followed by baby food (blueberry banana) and Oreo ice cream which showed 5% concentration. Tomato's reading was 1.5% which was surprising to see being a vegetable. Ranch dressing and tangerine followed next and the lowest reading was of potato at .25%. After adding the invertase, each food sample's concentration increased or remained the same.

**Conclusions/Discussion**
It shows that the sweeter the food is the more glucose it contains, such as sodas and high fructose corn syrup. This experiment proves foods containing sucrose or fructose can have hidden glucose in it which only gets released after digestion. The more glucose our bloodstream has the more insulin it requires and more chances are of it being converted into fat (triglycerides). The simple sugars such as glucose give us more sugar spikes and less storage energy. It is very crucial to see what kind of foods we are consuming and which types of sugars they actually contain.

**Summary Statement**
Actual amount of glucose digested from the different types of sugars we consume.

**Help Received**
I selected various foods to be tested for glucose content and my teacher reviewed my data and results.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Samantha B. Salazar

**Project Number**
**J0515**

**Project Title**
## How Do Natural Substances Affect Fruit Preservation?

**Abstract**

**Objectives/Goals**
The objective of this project is determine if natural substances can help preserve fruits.

**Methods/Materials**
fruits (apple slices and strawberries), bowls, ziploc bags, freezer, fridge, counter surface,

**Results**
The results of my investigation on the preservation of fruits were that the fruits with lemon juice in the fridge were less spoiled, compared to the fruits on the counter that had no natural preservative, lemon juice and apple cider vinegar, and the fruits in the fridge that had no natural preservative and apple cider vinegar. Also the fruits in the fridge were more fresh than the fruits on the counter. Had to throw away all fruits within 120 hours due to severe mold growth and then decomposing. Would not suggest consumers to ingest them after 48 hours. Lemon juice kept fruits fresh for 72 hours.

**Conclusions/Discussion**
After completing my investigation on the storage of fruits, I found that the fruits in bowls and bags with lemon juice lasted longer in the fridge rather than the fruits in bags and bowls on the counter. My hypothesis stated that storing fruits with lemon juice in the fridge is better since the coldness in the fridge holds back the bacteria which is the most effective because we would have longer time to eat and enjoy the fruits. My best variable for my project was the apples in the bag with lemon juice in the fridge because the lower temperature from the fridge kept the bacteria from growing as fast whereas on the counter they went bad on day 5 and had to be thrown out. Also, the fruits in the bags are not as exposed to oxygen which prevents oxidation and decomposition, and my worst variable for my project are the strawberries on the counter in the bowl with nothing since it is not controlled by temperature and is exposed to bacteria which then allows mold to grow faster.

**Summary Statement**
Lemon juice was the best natural substance in preserving fruit slices.

**Help Received**
Jewely Lickey, Glenn Kinney

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Bridget R. Vause

**Project Number**
**J0516**

**Project Title**
## Detection of Lactose in Natural and Processed Dairy

**Abstract**

**Objectives/Goals**
The objective of this project was to test different foods to see which ones had lactose in them to aid lactose-intolerant people in their food choices.

**Methods/Materials**
100 ml graduated cylinder (or pipettes with ml), glucose powder, urinalysis test strips, small plastic cups, measuring cup, lactose drops, water, various food items. First tested the glucose level using urinalysis test strips. Then, added lactase enzyme and tested again. If glucose level changed, food item contains lactose.

**Results**
The Takis and Doritos maintained the same glucose level after I added the lactase enzyme. The mac-and-cheese and regular milk had higher glucose, indicating a presence of lactose. The nacho cheese sauce had the highest level of glucose, yet it caused the ink in the glucose test strip to run. The lactose-free milk had a higher glucose concentration; most of the pure dairy products had no glucose concentration.

**Conclusions/Discussion**
Processed dairy foods don't necessarily contain a higher concentration of lactose than natural dairy. Lactose-free milk has a higher glucose level than other natural dairy. I think that the nacho cheese sauce caused the ink to run because it has certain chemicals. This experiment is repeatable and I tested each sample three times and put the averages on the graphs. Also, when I added the lactase drop, the glucose concentration usually increased because the enzyme lactase breaks the lactose into glucose, producing more glucose.

**Summary Statement**
I measured glucose levels to determine that boxed mac-and-cheese and milk have higher lactose levels than Doritos, yogurt and other dairy.

**Help Received**
My mother helped to gather supplies, otherwise, I designed, built and performed the experiments myself.

# CALIFORNIA SCIENCE & ENGINEERING FAIR
## 2018 PROJECT SUMMARY

**Name(s)**
Aisling K. Ward

**Project Number**
**J0517**

**Project Title**
## Dominant vs. Recessive Traits: Which One Dominates?

**Abstract**

**Objectives/Goals**
The objective of this study was to determine if dominant traits are more commonly expressed than recessive,and if so by how much.

**Methods/Materials**
I started this project by selecting 4 traits that could be used in this experiment. Next I created a test form that could be easily understood and explained. Then I went to my school and other places to find people willing to take part in this experiment. After 100 successful tests I collected my data and analyzed it.

**Results**
In only half (2 out of 4) of the traits tested the dominant was more commonly expressed. Therefore the results show that 30 participants had widow's peak (dominant trait) and 70 had a straight hairline (recessive trait). 29 participants had dimples (dominant trait) while 71 participants had no dimples (recessive trait). 60 participants had detached earlobes (dominant trait) and 40 participants had attached earlobes (recessive trait). Finally 85 participants had a smooth chin (dominant trait) and only 15 participants had a cleft chin (recessive trait).

**Conclusions/Discussion**
After all the data was collected and analyzed I came to the conclusion that dominant traits having a statistical advantage over recessive traits doesn't guarantee that the dominant form would be more commonly expressed than its recessive counterpart. Studies like this can inform people that are recessive can still be common and affect many people.

**Summary Statement**
I wanted to see if the statistical advantage dominant traits had over recessive traits automaticlly made dominant traits more commonly expressed.

**Help Received**
I created the test forms and collected the data myself, my teacher helped me gather information around this project.