



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Dawn F. Bransby	Project Number J0501
Project Title The Perfect Milk Substitute?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Do milk substitutes have a trace of lactose?</p> <p>Methods/Materials Soy milk, almond milk, rice milk, lactose free milk, test tubes, stopwatch, glucose tablets, lactase drops, Diastix Reagent for Urinalysis.</p> <p>Results The percentage of glucose found before and after adding lactase is as follows: water 0-0, glucose water 2-2, whole milk 0-.25, 2% milk 0-.25, almond milk 0-0, rice milk 0-.75, soy milk 0-0, lactose free milk 2-2.</p> <p>Conclusions/Discussion My hypothesis was incorrect. When I tested soy milk, almond milk, rice milk, and lactose free milk for lactose, I found no lactose in any milk substitute.</p>	
Summary Statement To find a perfect milk substitute there has to be no lactose which you can test for by adding the enzyme lactase and then test for glucose using Diastix glucose test strips.	
Help Received Dad helped order the glucose strips, glucose tablets, and lactose drops.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Kayley A. Bryan	Project Number J0502
Project Title Dissolution Rate of Lactase Tablets in Various Solutions	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The first objective of my experiment was to discover whether temperature of a drinkable solution had an effect on the dissolution rate of lactase enzyme tablets. My second objective was to discover whether the acidic solutions, coffee, tea or grapefruit juice, had a greater dissolution rate over the basic solution, milk or the neutral solution, water.</p> <p>Methods/Materials Seven common household solutions (hot coffee, tea & water, cold milk, grapefruit juice & water and room temperature water) were gathered to test the dissolution rate on lactase enzyme tablets. Two brands (Equate and Lactaid) of lactase enzyme tablets were chosen based on what was carried by my local Walmart. Each brand of pill was submerged in each solution, agitated and the time the tablet took to dissolve was measured. This was repeated 30 times for each solution and for each brand of tablet.</p> <p>Results The data indicated that cold water had the greatest dissolution rate on lactase enzyme tablets. This was especially true for the generic brand of tablet, Equate. The data further indicated that hot water, room temperature water and hot tea all had similar rates of dissolution and within the time indicated on the boxes of lactase enzyme tablets.</p> <p>Conclusions/Discussion Lactose intolerance affects many people worldwide. Without the assistance of commercially available lactase enzyme tablets, people would suffer greatly. In order to provide relief of symptoms, it is essential to know which brand would be most effective if taken and the approximate time relief can be expected. The data from my experiment suggested that cold water had the greatest dissolution rate on lactase enzyme tablets. Although I originally predicted that hot solutions and acidic solutions would have the greatest dissolution rates on lactase enzyme tablets, the data did not support these hypotheses.</p>	
Summary Statement The rate at which lactase enzyme tablets dissolve in various consummable solutions.	
Help Received Mother helped type report, teacher helped with graph types.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Aishik Chakraborty	Project Number J0503
Project Title Is There a Natural Substitute for Sunscreen?	
Objectives/Goals To find a natural substitute for sunscreen from turmeric, beet root, and sandalwood.	
Abstract	
Methods/Materials Materials: one grinder made of rock for Sandalwood. A kitchen Blender. One ounce of beet root. An ounce of sandalwood. An ounce turmeric. 85 SPF sunscreen. sunlight. An UV detector. 30 microscope slides. clipboard, pencil and paper. Method: Make paste of beet using kitchen blender. prepare turmeric paste using same blender. make sandalwood paste using rock grinder. Take a microscope slide and then take a bit of specimen at the tip of slide and smear it on the other slide. Make sure smearing is even. leave it to dry for a day at a dark place without UV. Take UV meter is out and make sure the UV level is 6 and then hold a plain glass slide underneath the meter and put the results on a piece of paper. Do the same thing 5 times. repeat the same procedure for the plain microscope slide except do it with each specimen, and keep on doing it until all 25 slides are finished. Measure absorbance.	
Results I got different results than I expected. Turmeric blocked the most UV radiation followed by Sandalwood and beet root the least. Turmeric absorbed 33% and reflected the rest. UV index is from 5 to 2. sunscreen absorbed 47% and reflected the rest. For sunscreen the UV index was from 5 to 1. All the specimen formed a coating. Sandalwood formed the thickest coating. Turmeric the second most and beet the least. Sunscreen didn't coat.	
Conclusions/Discussion My conclusion is that Turmeric would make the best natural sunscreen. I think turmeric blocked the most because it contained the anti-oxidant known as Curcuma.	
Summary Statement Is there a Natural Sunscreen (turmeric, beet root, and sandalwood) that can block UV closest to commercial sunscreen?	
Help Received My mom helped me in grinding specimen, dad helped me in explaining logarithms and spreading the specimen, and I would like to thank my science lab teacher Mrs Scott for helping me check parts of the notebook.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Alexander J. Howard	Project Number J0504
Project Title Study on the Effect of Vitamins and Minerals on Fermentation of Grape Juice	
Abstract Objectives/Goals The objective of this experiment was to determine if using additives, such as minerals or vitamins, will improve the fermentation of grape juice by creating a more healthy, sustainable yeast population. Methods/Materials The experiment had three groups: pure grape juice, grape juice with added minerals, and grape juice with added multivitamin and mineral pill. The CO(2) produced during fermentation was collected using a bubbler system. In Phase 1 of the experiment, measurements of the volume of CO(2) collected were taken at various times, until CO(2) production stopped. After 12 additional hours, Phase 2 of the experiment began. In Phase 2, extra grape juice was added to determine which yeast population could most efficiently start producing CO(2) again through fermentation. Measurements of the volume of CO(2) collected were taken at various times, until CO(2) production stopped. Results In Phase 1 of the experiment, the data showed that the group with added minerals had a slightly higher CO(2) production rate than the other two groups. In Phase 2, after adding additional grape juice, the group with added minerals produced a significantly higher amount of CO(2) in a shorter amount of time. In the first hour, it produced over 100% more CO(2) than the group with pure grape juice. Conclusions/Discussion The data collected shows that you can use additives to improve the fermentation of grape juice by yeast. The addition of minerals (calcium, magnesium, and potassium) provided the most benefit in the experiment, even better than the multivitamin and mineral pill.	
Summary Statement The project focused on determining which nutrients could help make a healthier, more sustainable yeast population.	
Help Received Mother provided materials; Father helped build the gas collection system	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Mary E. Jolly	Project Number J0505
Project Title Meaty Decisions: Which Size and Type of Meat Is Digested the Most in a 24 Hour Period?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to discover which size and type of meat will digest the most in a 24 hour period.</p> <p>Methods/Materials For my experiment I cut up pork, chicken, and beef into both large and small bite sized pieces, and after weighing them, left them overnight in a sealed plastic bag containing white vinegar. After 24 hours I drained off the liquid and weighed the solids.</p> <p>Results In my tests, the pork digested more than the other types of meat. Beef digested less than the chicken and pork. I also found that big pieces digested more than the small pieces.</p> <p>Conclusions/Discussion If pork digests quicker than beef and chicken it would seem to be the healthier choice. Even though my tests show that bigger pieces digested quicker, research I read makes me believe that my testing was flawed.</p>	
Summary Statement My project is about finding the healthiest meat by determining which one digests the most.	
Help Received Sister helped with topic; Mr. Gong helped find other variables; Dad was lab assistant; Mom helped with board.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Avi S. Khemani; Manan A. Shah	Project Number J0506
Project Title The Effects of Microwave Radiation Relative to Conventional Cooking Systems on the Denaturation of Proteins	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our project explores and compares the effects of microwave radiation on the denaturation of proteins relative to conventional cooking systems. Protein denaturation involves the disruption and possible destruction of the secondary and tertiary structures of the protein resulting in loss of biological activity, loss of solubility, destruction of toxins, improved digestibility etc. For example, the body absorbs protein safely from a cooked egg at the rate of 91%, while raw egg protein is absorbed at a rate of 50%.</p> <p>Methods/Materials Three precisely measured samples of egg white were cooked for one minute, two minutes, and 2.5 minutes each in both a microwave and a conventional stove. The cooked substance was then placed in a specialized test tube that was optimized for colorimeter use. After properly calibrating the colorimeter with plain egg white, the cooked material was placed in the machine to determine the light absorbance of each of the sample. The egg white would become more opaque as denaturation progressed. Measuring the percentage of absorbance would enable us to find which sample had been denatured more. A total of 16 tests were conducted.</p> <p>Results The microwave consistently denatured the proteins more relative to the conventional stove for each time period. For one minute time lapse, the microwave sample had an absorbance rate of 9.362%, while the stove sample had an absorbance rate of 11.929%. For two minute time lapse, the microwave sample had an absorbance rate of 8.322%, whereas the stove sample had an absorbance rate of 9.563%. For 2.5 minute period, the microwave sample had an absorbance rate of 1.593%, while the stove sample had an absorbance rate of 4.444%. These results were well within the standard deviation range and hence conclusive.</p> <p>Conclusions/Discussion From our data, we concluded that microwaves denature proteins consistently and significantly more than the conventional cooking stove. We further confirmed our findings through statistical error analysis. This provides evidence that cooking protein-rich food in microwaves is beneficial and not harmful. Our entire project work and other interesting facts can be found at http://proteindenaturation.webs.com.</p>	
Summary Statement Our project highlights the effects of protein denaturation and protein absorption loss by cooking food in a microwave relative to a conventional stove thereby highlighting the benefits of cooking food in a microwave.	
Help Received Teacher helped obtain materials.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Ahmed B. Mabrouk	Project Number J0507
Project Title How Sweet It Is	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project is to test which natural food types will give the fastest amount of glucose to the human body. The foods that are to be tested are all completely found in nature they range from honey, dates, and grapes. All of these are widely known to be sweet and pleasing to the test. These foods are to be tested before adding invertase, and enzyme that breaks sucrose into glucose and breaks down lactose to glucose.</p> <p>Methods/Materials Different concentrations of glucose tablets will be produced 0.5%, 0.25%, 0.09%, 0.08%, 0.07%, 0.0625%, and 0.06%. Followed by testing with the glucose meter and strip, the results will be recorded and will be compared to different solutions prepared from natural foods such as, dates, honey, and grapes. Different kinds of fruits will be tested after a dilution converting it to a 2.5% concentration of component to liquid. Therefore the glucose strip will be placed in the substance and the measurements will be recorded. Then one drop of invertase enzyme will be placed in 20 mL of water. Then over time periods of 45 minutes the amount of glucose formed from the reaction of the enzyme will be recorded.</p> <p>Results The results of this experimentation followed my hypothesis. Honey contained the highest glucose before adding the invertase enzyme. It was followed closely by dates; however there was a gaping hole between the reading of dates and the reading of grapes.</p> <p>Conclusions/Discussion The reason why there is almost no sucrose in honey for it is almost raw monosaccharaides (Glucose, Fructose). It is created from bees that have already digested and broke down all the complex sugars in honey. This is the cause why dates began to pull closer to honey for it contains more sucrose then honey.</p>	
Summary Statement Natural alternatives to treat hypoglycemia instead of the usage of glucose tablets.	
Help Received Mother helped with board, father helped to commence the experimentation, Ms. Hanan supervised the project.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Bilal Malik	Project Number J0508
Project Title Vitamin C in Vegetables: How Healthy Are Your Veggies?	
Abstract Objectives/Goals The purpose of this project was to see the effect of different cooking methods on the amount of Vitamin C in a vegetable. Methods/Materials First I made a starch solution using 2 grams of cornstarch in 200 ml. near-boiling distilled water. Then I made a Vitamin C solution(1mg/mL) using 2.5 mL of liquid Vitamin C(500mg/5mL) and enough distilled water to total 250 ml. I measured out 20 ml. of the Vitamin C solution in the beaker and added 10 drops of the starch solution into it. I then measured out 10 ml of Lugol's Solution into a graduated cylinder. I started to add drops of the Lugol's solution into the beaker, and stopped when I noticed a blackish color change in the solution. I noted the amount of Lugol's solution remaining in the graduated cylinder. I repeated these steps three times. Then I cooked the vegetables (cauliflower, bok choy, and yellow bell pepper) five different ways (grill, microwave, stir fry, roast, and boil) and pureed and strained them. I repeated the same steps as for the titration of Vitamin C solution. I then calculated the amount of Vitamin C using proportions. Results My results were that grilling resulted in the most amount of Vitamin C loss in Cauliflower (85.04 %), followed by boiling and stir-frying (57.58%). In the Bok Choy, boiled and grilled cooking methods showed the most amount of Vitamin C loss (66.74 %), followed by roasted (61.27%). In the Yellow Bell Pepper, boiled cooking method showed the most amount of Vitamin C loss (51.39%), followed by roasted (45.43%) and grilled (42.45%). Microwaving showed the least amount of loss in most cooking methods. Conclusions/Discussion My results show that the grilled cooking method resulted in the most amount of Vitamin C lost in cauliflower and bok choy, but the boiled method resulted in the most amount of Vitamin C lost in yellow bell pepper. The grill pan I used was made of cast-iron. Cast-iron pans have been shown to add iron to the food that is cooked in them. The greater loss of Vitamin C shown in the grilling method of cooking may have been a result of iron from the pan reacting with the Vitamin C. All cooking methods destroy an amount of Vitamin C in vegetables. There are different factors (heat, water, and oxidation) that determine how much. Eating vegetables raw rather than cooked would give you the most amount of Vitamin C.	
Summary Statement My project evaluates different cooking methods effect on the Vitamin C content of vegetables.	
Help Received My mom helped me cook the vegetables.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Eveline S. Mayner	Project Number J0509
Project Title Take a Bite Out of the Myth: The Vitamin C Content of Genetically Engineered vs. Organic Papayas	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to determine if the genetically engineered papaya, has higher or lower Vitamin C content than that of its organically grown predecessor.</p> <p>Methods/Materials Fifteen genetically engineered papaya and fifteen organic papaya were purchased. The papayas were juiced shortly before each test. To measure the amount of Vitamin C in the papaya juice samples, I used the titration method. In my case titration was the use of iodine to measure the amount Vitamin C. The Vitamin C oxidizes the iodine therefore leaving the solution. Corn Starch was added to each of my juice samples as an indicator so that when the Vitamin C was completely gone from the juice, the iodine would react with the cornstarch turning a dark blue. Prior to my papaya testing I tested a reference sample of a pure Vitamin C tablet, using the same method. This test showed me how many drops of iodine it took to saturate twenty milligrams of Vitamin C. Based on this, I created an equation that would calculate the amount of Vitamin C per twenty milliliters of each juice sample. The levels of Vitamin C in the genetically engineered papayas were then compared to that of the organic papayas.</p> <p>Results On average, the genetically modified papaya had 16% more Vitamin C per twenty milliliters of juice than the organically grown papaya.</p> <p>Conclusions/Discussion The United States of America has the highest rates of genetically modifying food in comparison to any other nation. Genetically modifying is the latest advancement in biotechnology and uses molecular biology techniques. To genetically engineer a food, geneticists must sequence the genomes, isolate and extract the desired gene, then insert it into the food using a gene gun. Genetically engineered food is the source of much controversy. Genetically engineered food makers are often accused of seeking profit without concern for health consequences. Genetically engineered crops are often more reliable and can be made resistant to herbicides or disease. Based on my results one could also conclude that the genetically modified papayas have the health benefit of a higher Vitamin C content, but whether or not this true for other health aspects requires further investigations.</p>	
Summary Statement My project compares the Vitamin C content of the genetically engineered papaya, to that of its organic predecessor.	
Help Received My mother helped me cut and glue papers on to the poster board.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Mikayli A. Moore	Project Number J0510
Project Title Pepper Power: A Titration Experiment	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I did my project to see if the vitamin C content in red bell pepper concentrate would be affected by the growing method {organic, hot house, or conventionally}. I predicted that a hot house pepper would contain the most vitamin C.</p> <p>Methods/Materials Two pounds of organic, hot house, and conventionally grown peppers were used. I blended the peppers, then used a cheesecloth to drain the pepper juice. I added ten drops of starch to the solution, because when the iodine is finished reacting with the vitamin C, it will be turned blue by the starch, and that is when you are done titrating. I tested each type of pepper four times.</p> <p>Results The organic pepper sample contained the highest level of vitamin C at 36.99 mg, the hot house pepper had 34.04 mg, and the conventionally grown pepper had 33.98 mg. My results were not consistent, and the difference in the vitamin C levels was not large.</p> <p>Conclusions/Discussion My conclusion is that organic red bell peppers contain the most vitamin C, but not by much. If the all the samples were rounded to the nearest whole number, organic would contain 37 mg, the hot house would reach 34 mg, and the conventionally grown would also equal 34 mg. As you can see, the organic only led by 3 mg.</p>	
Summary Statement I wanted to know if the vitamin C content in red bell peppers would be affected by different growing methods (organic,conventional or hot house) at room temperature.	
Help Received My mom, who acted as a second advisor, bought the required materials and helped in preparation of the chemicals.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Sophie Parsa; Ruby Rorty	Project Number J0511
Project Title Genetically Modified? A Study of Santa Cruz Zucchini	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our objective was to determine whether Santa Cruz zucchini carried the coat protein of the Watermelon Mosaic 2 Potyvirus, which would demonstrate that they were genetically modified.</p> <p>Methods/Materials We isolated DNA from zucchini purchased at four different local grocery stores and used a UV spectrophotometer to examine its quality and determine its concentration. To amplify the DNA, we performed polymerase chain reactions, using primers specific to Watermelon Mosaic 2 Potyvirus and phloem.</p> <p>Results The concentration of DNA we extracted from the four different sources of zucchinis ranged from 23.6 ng/μl to 48.8 ng/μl. For a positive control for PCR, we successfully amplified sequence from phloem, which is found in all plants. We also attempted to amplify sequence from the Watermelon Mosaic 2 Potyvirus, but this PCR was not successful, indicating that none of the zucchinis were genetically modified. Repeated attempts have been made to obtain positive control seeds of genetically modified zucchini from Monsanto, but so far the company has not fulfilled our request.</p> <p>Conclusions/Discussion Our results suggest that the zucchinis we tested were not genetically modified. This led us to the conclusion that the genetically modified seeds were not widely adopted by farmers, supported by the fact that not all of the zucchini were grown in Santa Cruz County.</p>	
Summary Statement Our project examined genetic modification of organic and non-organic Santa Cruz zucchini.	
Help Received We used lab equipment at the Univeristy of California, Santa Cruz under the supervision of my mother Dr. Lindsay Hinck.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) John M. Shepherd	Project Number J0512
Project Title Carbohydrates vs. Fats: Which Nutrient Contains the Most Energy and Calories?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine which nutrient, carbohydrates or fats, contains the most chemical energy and calories.</p> <p>Methods/Materials A calorimeter was constructed using a small coffee can, with the top removed and filled with water, nestled within a larger coffee can with the top and bottom removed. A rod was placed through the calorimeter to allow the small can to sit high enough to place a food item underneath it. Different small food items were weighed and then burned and the difference in temperature of the water in the small can was measured. What remained of the food item was then weighed. These steps were repeated three times for three different types of food items (marshmallows, almonds, and Chex cereal).</p> <p>Results The heat captured/energy stored for carbohydrates ranged from 200 calories to 780 calories (0.2 to .78 Calories), whereas the heat captured/energy stored for fats ranged from 1,000 to 2,900 calories (1.0 to 2.9 Calories).</p> <p>Conclusions/Discussion The results show that fats have more chemical energy stored in them than carbohydrates. More energy was released when fats were burned than when a carbohydrate was burned. Because fats are made up of fatty acids and carbohydrates are made up of glycogen, they release energy differently when burned. Carbohydrates are a quick source of energy, whereas fats are a longer lasting source of energy. I did this experiment because child obesity is at an all-time high and I wanted to understand how you find out how many Calories a food item has and what that means to your body and diet. My conclusion is also that if more kids understood how food and energy relate to your body and diet, it could help in lessening child obesity.</p>	
Summary Statement My project is to determine which nutrient, carbohydrates or fats, contains the most chemical energy and calories by burning a food item and using a calorimeter and to see if this information might be helpful in combatting child obesity.	
Help Received My mom supervised me during the testing of this project.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Dylan P. Whitaker	Project Number J0513
Project Title Drink This, Not That! Carbohydrate Containing Drinks Decay Teeth Even When Brushing Twice a Day	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to determine which common carbohydrate-containing beverage caused the most tooth decay and if brushing the recommended 2 minutes twice a day would be protective.</p> <p>Methods/Materials Discarded baby teeth (my own) were placed in various carbohydrate-containing beverages for 30 days. Common drinks available to children and teens were used including cola, clear soda, Gatorade, apple juice, and milk. Water was used as the control. The fluids were changed nightly. The teeth were brushed twice a day for 6 seconds each to equal 2 minutes total for the whole mouthful of teeth; matching the American Dental Association's recommendations. A separate baby toothbrush and child toothpaste were used for each type of beverage. Each tooth was weighed and pictures were taken weekly to track decay progress. Data was analyzed using computer graphing.</p> <p>Results Milk and Gatorade caused equally most damage with 69% tooth loss, and all liquids caused at least 16% more decay than water.</p> <p>Conclusions/Discussion Although my hypothesis was not supported, cola did not show the most decay, the experiment did support the statement made by Dr. Craig Hollander D.D.S., M.S., that "any beverage other than water can cause cavities". Cola is often removed from schools in California, but milk is frequently served as part of school lunch and students may bring juice or other sugary drinks, dental health could be improved by schools offering teeth cleaning opportunities and access to dental health websites.</p>	
Summary Statement Which carbohydrate-containing beverage will cause the most tooth decay, even when teeth are brushed 2 minutes twice a day?	
Help Received Mother: supervised and guided research, checked product design and math, typed and helped with some pictures	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Maya R. Wilson	Project Number J0514
Project Title The Effectiveness of Antioxidants on Inhibiting Enzymatic Browning	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine if antioxidant beverages with higher rankings on the USDA Oxygen Radical Absorbance Capacity (ORAC) scale will more effectively protect a cut apple from the oxidation that occurs during enzymatic browning.</p> <p>Methods/Materials I tested green tea and 4 different antioxidant fruit juices (with high, medium, and low ORAC scores) by soaking apple slices in the beverages and placing them in the air to oxidize. I observed the apples at intervals and measured the extent of enzymatic browning using a score sheet I created that included both extent of browning and depth of color. The amount of enzymatic browning determined the amount of oxidation and the effectiveness of each antioxidant. I repeated the experiment three times.</p> <p>Results Based on the averages of my experiments, the order of effectiveness was lemon juice (ORAC 1,225) which performed 73% better than the control (filtered water), mangosteen juice (ORAC 2510) performed 43% better, green tea (ORAC 1,253) performed 13% better, pineapple juice (ORAC 568) performed 10.6% better, and papaya juice (ORAC 300) performed 2.4% better than the control.</p> <p>Conclusions/Discussion My hypothesis that antioxidants with higher ORAC values will reduce the amount of enzymatic browning better than those with lower ORAC scores was correct for 4 out of 5 antioxidants tested. The exception was lemon juice, which despite having a lower ORAC score than either mangosteen juice or green tea, did significantly better than all the others in all 3 experiments. Mangosteen, with a very high ORAC score, did significantly better than the three other juices while papaya, with the lowest ORAC score, did only slightly better or in 2 cases, worse than the control. Generally, the higher the ORAC score, the better the beverage worked to reduce enzymatic browning. Thinking about why the lemon juice did better than all the others despite having only a midrange ORAC score, I believe it may be because lemon juice combines a midrange ORAC score with a high acidic PH value, providing stronger protection against oxidation and enzymatic browning than beverages with a high ORAC score and a lower ph score. Testing this hypothesis would be an interesting experiment for next year!</p>	
Summary Statement My project determined that generally a higher ranking on the USDA ORAC scale of an antioxidant beverage will better protect a cut apple from the oxidation that occurs during enzymatic browning, with the exception of highly acidic juices.	
Help Received My mother helped me stay organized, took photos, and assisted me in cutting paper for my backboard.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Alexander J. Faille	Project Number J0593
Project Title Swab, Swab, Is It Clean or Dirty?	
Abstract Objectives/Goals The objective of this project is to test surfaces to determine which surface is the most protein, sugar, and organic matter free. Methods/Materials There are three tests used in the process of this experiment. The tests are the Spotcheck-plus which tests for sugars, the Pro-clean which tests for proteins, and the final test is the Ultrasnap test which is a test for organic matter, and is measured in RLU's or radiant light units. To test a surface one must remove the detection swab from the plastic tube. After, simply swab the surface in a zigzag like motion. Put the plastic tube back on then break the snap valve at the top of the detection swab. If the test is the Spot-check plus or Pro-clean test then it will be a color test. On the Spot-check plus green means the surface is contaminated with sugars whereas if it is clear then the surface is sugar free. On the Pro-clean test green means there are no proteins and any color from clear to purple means there are proteins on the surface. The Ultrasnap after testing a surface, is put into the RLU reader which gives you an RLU reading. 50 or less is considered clean whereas any reading above 50 is contaminated. Results Ultimately, all of the surfaces were protein free except for inside the refrigerator. All of the surfaces were sugar free; nonetheless, all of the surfaces were contaminated with organic matter because they all had a reading over 50, actually the readings were all over 100. However, once the surface was cleaned they all seemed considerably clean and were no longer harmful with bacteria. Conclusions/Discussion The results did not support the hypothesis because the most contaminated surface which contained 407 RLU's and was contaminated with proteins was the inside of the refrigerator, and the least contaminated surface was the bathroom counter which contained 116 RLU's and was sugar free and protein free. RLU stands for radiant light unit which comes from luciferases which are what cause fireflies to glow, hence the name radiant light units, and there are multiple luciferase contained in the liquid above the snap valve; therefore, how many luciferase react with the organic matter molecules gives the RLU reading.	
Summary Statement The experiment depicts which surface is truly the most sugar free, protein free, and organic matter free which involves three tests depicting the proteins, sugars, and organic matter on a surface.	
Help Received Dad helped retrieve tests from his work: Hygiena/MPC, and taught me how to use each test.	



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Abigail E. King	Project Number J0594
Project Title Too Sweet?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I am comparing the amount of glucose in canned fruit and fresh fruit. I want to learn the difference between the two; which has more glucose. I believe the fresh fruit will have less glucose. This experiment will help two major issues in the world's health. These two issues are childhood obesity and people with diabetes.</p> <p>Methods/Materials I am comparing the amount of glucose in fresh fruit versus canned fruit. The three types of fruit I will be testing are oranges, pear, and grapefruit. I will start by testing the canned fruit. Science I want to test how much glucose the fruit has absorbed, I will wash the fruit of under water. Then, after I place it on a plate I will cut a small slit in the fruit with a knife. I will then use a glucose test strip and put the test pad into the slit. I will take it out and set the timer for 30 seconds. Once the 30 seconds are up I compare the color of the glucose test strip to the color on the container. This will tell me how much sugar is in the fruit. I will repeat this for all the canned fruit. For the fresh fruit I will cut it up. Once I do that I will cut a slit in it and place the glucose test strip pad inside it. I will take the pad out and after 30 seconds compare the color of the glucose test strip to the color on the container. I will repeat all these steps two more times and then compare my results.</p> <p>Results The results of my experiment were that fresh fruit has less glucose than canned fruit. In the oranges this was most evident because the fresh fruit had less glucose than the canned fruit. The canned fruit had about 2,000mg of glucose while the fresh only had 1,000mg of glucose. The fruit with the least evident conclusion was the grapefruit. The canned grapefruit was 1,000mg of glucose while the fresh was 950mg of glucose. The pear was in the middle with the canned being 1,000mg of glucose while the fresh was 750mg of glucose.</p> <p>Conclusions/Discussion My results proved my hypothesis correctly which means the fresh fruit has less glucose than the canned fruit. The canned fruit always had more glucose than the fresh fruit, no matter how large the difference was. If I did do this project again I would probably also include another component. This would be fruit that was kept in its own juice. This would help me learn if the syrup is the only factor that is making the canned fruit have more sugar in it or whether it is something else.</p>	
Summary Statement Finding hidden glucose in fresh and canned fruits.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Ruhi Sayana	Project Number J0595
Project Title Targeting Postprandial Hyperglycemia: Novel Use of Cyanidin and Eugenol to Inhibit alpha-Glucosidase for Type 2 Diabetes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Diabetes is a lifelong chronic disease where high levels of glucose are in the blood. The American Diabetes Association states that in 2011, 25.8 million Americans had diabetes. In Type 2 Diabetes, postprandial hyperglycemia, an exaggerated rise of blood sugar after a meal, occurs. To reduce postprandial hyperglycemia, the activity of the enzyme alpha-glucosidase, which catalyzes the hydrolysis of maltose to glucose units, must be lowered. The goal of my research project was to test the in vitro enzyme inhibitory activity of alpha-glucosidase by the novel, plant based inhibitors, the anthocyanin cyanidin and the phenylpropane eugenol, and comparing inhibition to the FDA approved drug acarbose.</p> <p>Methods/Materials An enzyme solution was prepared at the concentration of 6.7 mg/mL. A solution containing assay buffer, substrate, and 10 µL eugenol was prepared, and that solution was pipetted into a micro cuvette for the spectrophotometer reading. After adding enzyme, activity was measured at 2, 5, and 10 min with the wavelength of the spectrophotometer at 405 nm. The previous step was repeated using 15 µL of eugenol, 5 and 10 µL of cyanidin, and all three concentrations of positive control acarbose. Cyanidin and acarbose were dissolved at the concentration of 2 mg/mL. The assay was also tested with the enzyme only to compare data. This experiment was repeated in triplicates, and total of 19 assays were conducted to determine results.</p> <p>Results For data analysis, the overall enzyme activity rate over 5 minutes was calculated. Cyanidin worked best, reducing the enzyme catalyzing rate from 101.59 U/L to 16.15 U/L at 3.1 mM over 5 minutes. At 6.2 mM, the rate was reduced to 25.99 U/L. Eugenol also inhibited the enzyme, reducing the rate to 93.33 U/L at 256 mM and to 3.13 U/L at 384 mM. Cyanidin worked better than acarbose by almost 3.5 times.</p> <p>Conclusions/Discussion This research has discovered that both eugenol and cyanidin are novel inhibitors of the enzyme alpha-glucosidase, and both can, with additional experimentation, be used to reduce postprandial hyperglycemia, leading to a possible solution to Type 2 Diabetes. Both of these inhibitors possibly work through the process of uncompetitive inhibition, where the inhibitor binds onto the enzyme-substrate complex, which displaces the equilibrium created. More amounts of substrate are therefore needed to produce the product, which lowers the activity of the enzyme.</p>	
Summary Statement My research identified two novel and natural alpha-glucosidase inhibitors as potential therapeutic agents for postprandial hyperglycemia, and were successfully tested with in vitro spectrophotometric assays.	
Help Received My mentor, Dr. Stephens from Santa Clara University, guided me through my project; my science teacher, Ms. Nguyen, and my parents supported me.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) David M. Duncan	Project Number J0596
Project Title What's in the Food We Eat? Identifying Genetically Modified Foods Using DNA Analysis	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my experiment is to determine if common foods from Los Angeles grocery stores contain genetically modified organisms (GMOs). I believe that many of the foods I test will test positive for genetic modification. In the United States, foods containing GMOs are not labeled.</p> <p>Methods/Materials To check for genetic modification, I tested the food samples for two GMO-associated DNA sequences. If a food tested positive for one or both of these DNA sequences, it would indicate that it had been genetically manipulated. To conduct the experiment, I used a three-step process: (1) Food preparation and DNA extraction; (2) Polymerase Chain Reaction (PCR) -- using GMO and plant primers, and a wet bath method; and (3) Gel electrophoresis and a gel staining process.</p> <p>Results The results of the DNA testing showed that sixteen out of the twenty-two food samples tested positive for genetic modification; six food samples tested negative. (My positive control tested positive for GMOs, and my negative control tested negative.)</p> <p>Conclusions/Discussion I accept my hypothesis that many of the selected foods from Los Angeles grocery stores would test positive for genetic modification. In the United States, the first genetically modified foods were grown in 1994. The U.S. does not require food to be labeled for GMO content. In fact, foods containing less than 5% GMOs can be labeled as "GMO-free." There is still a lot to be learned about GMOs and their potentially positive or negative effects on human health and on our environment.</p>	
Summary Statement My experiment tests common foods for genetic modification using DNA analysis.	
Help Received My science teacher (Norm Brennan) and my parents helped me order and get supplies and equipment for my experiment; Mr. Brennan advised me about contamination control; my father helped me with the boiling water for the wet bath; my parents drove me to grocery stores to buy food for my experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Mythri Ambatipudi	Project Number J0597
Project Title Diet Induced Thermogenesis! Combating Obesity, Diabetes & Heart Diseases Using Anthocyanins, Catechins & Capsaicins	
Abstract Objectives/Goals Obesity and related diseases such as Diabetes Mellitus (DM) and cardiovascular diseases (CVD) are caused by chronic imbalance between energy intake and expenditure. A novel strategy for combating this imbalance is through Diet Induced Thermogenesis (DIT). DIT, caused by enzyme inhibition or heat generation in brown adipose tissue, is the additional calories the body burns from its internal reserves due to special diet intake. DIT leads to reduced obesity and lower blood glucose, triglyceride & fatty acid levels. The objective of this project is to find a potential natural treatment for obesity, DM and CVD by testing if berries, teas, herbs & spices (BTHS) containing anthocyanins, catechins and capsaicins increase the DIT values of the carbohydrate, lipid & protein (CLP) macronutrients. Methods/Materials The in vivo processing of the CLP macronutrients was simulated in three in vitro experiments conducted on CLP solutions at 98 deg.F. CLP reactions were catalyzed with alpha-amylase, lipase and pepsin enzymes respectively. Equal concentrations of 14 types of BTHS extracts containing anthocyanins, catechins, capsaicins, proanthocyanadins and isothiocyanates were selected. The increase in the in vitro reaction times with the extracts (versus the control set up) was used to calculate their inhibitory effects on the enzymes and their DIT effects on the CLP macronutrients. Reaction rates were accurately measured with the innovative use of Benedict's, Biuret's and phenolphthalein indicators, bile salts, high accuracy pH & glucose strips, etc. Results Berry & tea extracts inhibited the hydrolysis of all three macronutrients. Raspberry increased the DIT values of carbohydrates (42.7%) and lipids (19.8%) the most while green tea increased the DIT value of proteins (9.9%) the most. IC(50) values (amount required for 50% inhibition) of raspberry, strawberry and green tea were among the lowest. DIT values of carbohydrates were improved the most followed by lipids. Contrary to the expectations, red chili capsaicin & ginger increased the reaction rates of the CLP. Conclusions/Discussion This project clearly demonstrates that adding BTHS rich in anthocyanins, catechins, proanthocyanadins & isothiocyanates to CLP macronutrients can increase their DIT effects. This can lead to reduced obesity, postprandial hyperglycemia & triglyceride levels. DIT effects of capsaicins need further research.	
Summary Statement My project aims to identify potential natural treatment for obesity, diabetes and heart diseases by increasing the DIT values of the macronutrients using foods rich in anthocyanins, catechins and capsaicins.	
Help Received My science teacher, Mrs. Makhijani provided valuable guidance. My parents purchased all the materials and provided encouragement.	



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Hannah L. Ward	Project Number J0598
Project Title I'd Rather Die Than Use Die	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of the experiment was how the different quantities of Red40 dye affect the Carbon Dioxide rise produced in yeast. By predicting that the highest quantity, of 1.5 grams of Red40 would make the most CO₂ rise, than the other quantities (.5, 1, 1.5). The hyperactivity and hypersensitivity levels already in Red40 have been shown in recent studies that they cause significant health issues.</p> <p>Methods/Materials First I set the 5 fermentation tubes up side by side with timers. Next I used yeast 2 1/2 teaspoons (one packet) and then measured 2tbs of sugar into another separate cup. I then boiled water in a pot burner until it reached between 40-45°C using a thermometer and I measured 1 cup mixing it with the sugar and yeast, mixing with a spoon. For the dye measurements I used a scale (g), to get the right amount of Red40: .5, 1, 1.5. When the dilutions were done, I poured them quickly in a cylinder to fill each fermentation tube. Following, I used my thumb and tilted the tubes over until it stuck to the top of the measuring portion. I started the timer right away; one after another until all five were being clocked, marking at each minute of mL fermented in 15min.</p> <p>Results The data collected, 1.5 grams of Red40 combined into the yeast mixture did have the most carbon dioxide rise. There were 5 trials tested, each mixture tested (0 grams, .5 grams, 1.0 grams, and 1.5 grams), were measured at the time intervals of 5, 10, 15 minutes. The 0 grams of Red40 had the average of 1.24 mL fermented at 5 minutes, 10 minutes the average was 3.34 mL, and finally the average volume fermented was 4.82mL at 15 minutes. The averages for .5 grams of Red40 was 1.5 mL at 5 minutes, 3.8 mL at 10, and at 15 minutes 5.38 mL. The 1.0 gram of Red40 had of 1.58 mL fermented at 5 minutes, 10 minutes averaged 2.9 mL and then 4.04 mL at 15 minutes. 1.5 grams of Red40 at 5 minutes was 2.72 mL fermented, 10 minutes averaged 5.14 mL, and 15 minutes averaged to 7.46 mL fermented.</p> <p>Conclusions/Discussion In conclusion, the data I collected proves my hypothesis to be correct; because looking at the averages and all of the trials tested, the 1.5 grams fermented the quickest/most within the time period (5, 10, 15min). In the end the experiment connects to the real world by people needing to watch what we eat, because this dye might cause dramatic affects to the body that people need to look out for.</p>	
Summary Statement My project is about how testing the different quantities of Red40 dye affect the Carbon Dioxide rise within yeast, this then can determine if greater quantities can lead to major health risks due to the many products we consume daily.	
Help Received Ms. Fisher: Helping me organize/get me started, Mrs. Diaz: help me type my report, My mom: helping organize my board, Summer H, Julia M, Jada T & Caroline C: helping take pictures/help me clean up after testing	



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Payge N. Estrada	Project Number J0599
Project Title Preserve... If You Dare	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The problem was how will the chemical sodium benzoate effect the rate at which the catalase react. My hypothesis is that the chemical sodium benzoate will affect the rate at which the catalase react due to the fact that sodium benzoate is a toxic powder that when consumed or used will choke cells and not allow the catalase to function and react to any harm that will influence the body thus the liver alone without the sodium benzoate will have a quicker reaction time than the liver with 1 g & 2 g of sodium benzoate.</p> <p>Methods/Materials Make a hydrogen peroxide solution by adding distilled water to 3% hydrogen peroxide. Punch holes from a filter with a hole puncher. Make a catalase solution by placing a liver in a blender with distilled water, use forceps to dip a filter disk into the catalase solution. Fill test tube with hydrogen peroxide solution. Grab a one-hole stopper and use forceps to take the soaked filter disk and place on the end of the one-hole stopper. Push the one-hole stopper into the test tube, place your thumb over the hole in the stopper, invert the test tube and remove your thumb, starting the stop watch. Record the time it takes for the disk to rise to the top of the test tube. Repeat these steps with a catalase solution that contains 1 g & 2 g of sodium benzoate. Let all the catalase solutions sit in refrigerator for 12 hours. Place the solutions back in the refrigerator for 12 more hours then conduct final trials.</p> <p>Results My hypothesis was proven correct. My hypothesis was correct because at 0 hours the controlled solution had an average time of 8.89 seconds, the 1 gram solution had an average time of 12.23 seconds, & the 2 grams solutions had an average time of 16.76 seconds. After 12 hours the controlled solution had an average time of 11.71 seconds, the 1 g solution had an average time of 15.83 seconds, & the 2 g solution had an average time of 20.07 seconds. After a total of 24 hours the controlled solution had an average time of 12.61 seconds, the 1 g solution had an average time of 18.55 seconds & the 2 g solution had an average time of 19.9 seconds.</p> <p>Conclusions/Discussion My data proved that my hypothesis was supported. My science fair topic ties into the real world because the consumption of sodium benzoate can be permanent. Too much sodium benzoate can lead to many side effects, changes to the cells in your body, liver diseases and failure, which can lead to cancer and death.</p>	
Summary Statement My project was to test the effects of the preservative Sodium Benzote on the catalase enzymes in the liver.	
Help Received Ms. Fisher gave me resources and a place to work; Zach Hutchings helped me with timing and collecting data; my mom provided materials; took pictures and helped me document data; my sister helped with my binger and science fair tips; the judges gave me feedback and reveiwed my project	