CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Serena A. Ahmad

Project Number
J0401

Project Title
Vitamin C (Ascorbic Acid), Grapefruits, and Me

Abstract

Objectives/Goals
How does shelf life affect the amount of Vitamin C (Ascorbic Acid) in grapefruits? Will there be more, less, or the same amount of Vitamin C in a grapefruit that has been sitting on a shelf for one to four weeks opposed to a freshly picked grapefruit?

Methods/Materials
Two identical grapefruit trees in the same location and with the same sized fruit.
A black marker-for labeling, Ascorbic Acid Titrant-118Ml(4 oz)MDB*; Sulfuric Acid Standard Solution,5.25N-118Ml(4 oz)MDB*; Starch Indicator Solution-118Ml(4 oz)MDB*; Erlenmeyer Flask, 125 Ml; Centrifuge Tube, 15Ml, polystyrene; Demineralized water; MDB*: Marked Dropping Bottle

Results
TESTING DATE-2/18/07 (The grapefruits were picked on the date shown)
The results were:
1/14/07 - 48 drops of Ascorbic Acid Titrant(AAT)in Tree A's solution/43 drops into Tree B's.
1/18/07 - 39 drops of AAT into Tree A's solution/36 drops into Tree B's.
1/21/07 - 37 drops of AAT into Tree A's solution/35 drops into Tree B's.
1/25/07 - 36 drops of AAT into Tree A's solution/35 drops into Tree B's.
1/28/07 - 36 drops of AAT into Tree A's solution/33 drops into Tree B's.
2/1/07 - 41 drops of AAT into Tree A's solution/26 drops into Tree B's.
2/4/07 - 36 drops of AAT into Tree A's solution/30 drops into Tree B's.
2/08/07 - 31 drops of AAT into Tree A's solution/22 drops into Tree B's.
2/11/07 - 27 drops of AAT into Tree A's solution/17 drops into Tree B's.
2/15/07 - 20 drops of AAT into Tree A's solution/19 drops into Tree B's.
02/18/07 - 8 drops of AAT into Tree A's solution/4 drops into Tree B's.

Conclusions/Discussion
The research, data, and experiment results, proved my hypothesis to be correct!The grapefruits picked 4 weeks ago had less Vitamin C than those freshly picked.

Summary Statement
The purpose of this experiment is to figure out if a shelved grapefruit is better for your body than a freshly picked grapefruit.

Help Received
Mother helped with taking the pictures and putting the pictures and headings on the board.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Kirsten I. Albers

Project Number
J0402

Project Title
Got Milk? Evaporation Rates of Milk

Abstract

Objectives/Goals
Problem: Does fat content effect the evaporation rate of liquid milk? If so, which amount of fat content will evaporate the fastest?
Hypothesis Yes, I think fat content will affect the evaporation rate of liquid milk. I think whole milk will evaporate the fastest because it will turn into cream first which should speed up the process of evaporation. Fat content will affect the evaporation because it affects the amount of solids and vitamins which might change how fast the milk evaporates.

Methods/Materials
Procedure: 1. Buy each kind of milk, same brand with same expiration date. Set up table and Petri dishes. 3. Pour three milliliters of milk in each Petri dish (30 of each type of milk). 4. Separate and label sections of tables with each type of milk. 5. Every two hours, weigh each dish in order on the scale. 6. Continue every 2 hours for 12 hours, writing down weight for each dish. 7. Average each type of milk between samples.

Results
In my experiment, the results showed that whole milk evaporated the most with 1.438 grams evaporated. 2% evaporated 1.328 graFather helped withms, nonfat evaporated 1.324 grams and 1% milk had the least amount evaporated with 1.306 grams evaporated.

Conclusions/Discussion
Conclusion: In conclusion, the fat content in milk affected the evaporation rate and whole milk had the highest evaporation rate. This proved my hypothesis correct. The next highest was 2% milk, then nonfat. The milk with the lowest evaporation rate was 1% milk. This shows a general correlation between fat and evaporation, but also shows that other elements such as solids or lactose in milk also affect the evaporation rate.

Summary Statement
My project tested to see whether the fat content in liquid milk would affect the evaporation rate.

Help Received
Father helped with writing results while I did the experiment.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Alyssa L. Chan

Project Number
J0403

Project Title
Effects of Chelation on Catalase Activity: Implications in Alzheimer's Disease

Abstract

Objectives/Goals
The possible mechanisms of Alzheimer's disease include aggregation of proteins to form plaques and neurofibrillary tangles and metal ion mediated formation of hydrogen peroxide. Catalase breaks down hydrogen peroxide into oxygen and water and may thus be useful in Alzheimer's prevention.

Methods/Materials
I tested the impact of metal salts on catalase activity. I also studied the effect of the chelating agent, EDTA and turmeric, an antioxidant and potential chelator. I monitored the results by the floating disc method. I dropped a filter paper disc saturated with catalase solution into a hydrogen peroxide and metal ion and/or EDTA, turmeric solution. I then measured the time for the disc to rise to the surface.

Results
A total of 180 tests were performed in this experiment with five different metal ions. Three of five metal ions studied, aluminum (Al3+), zinc (Zn2+), and calcium (Ca2+), reduced catalase activity. Aluminum (Al3+) was the most damaging, slowing the reaction by 20%, followed by zinc (Zn2+) (11%), and calcium (Ca2+) (4%). Calcium impacts may not be significant because of the small drop in reaction rate. Surprisingly, manganese (Mn2+) and magnesium (Mg2+) increased the reaction rate by 18% and 20%, respectively. The addition of turmeric did not impact the reaction rate in the presence or absence of aluminum (Al3+). EDTA alone depressed the catalase reaction by 14%. The combination of EDTA and metal ions was found to consistently inhibit catalase activity, no matter whether the ion alone increased or decreased the reaction rate. The EDTA and metal combination reaction reduction rate was 79% for aluminum (Al3+), 79% for zinc (Zn2+), 60% for calcium (Ca2+), 71% for manganese (Mn2+) and 61% for magnesium (Mg2+).

Conclusions/Discussion
My results show that it is necessary to test the effects of chelation not only on metal ions, but also on key enzymes. The widely suggested chelation therapy for Alzheimer's disease using EDTA may not be helpful, but may in fact be detrimental. In this experiment, EDTA, when combined with any of the metal ions tested, consistently and potently inhibited catalase activity. This could significantly affect the breakdown of hydrogen peroxide and impact catalse's ability to protect the cell from death.

Summary Statement
This project investigated the effects of metal ions, EDTA and turmeric on catalase activity and found some metal ions depressed catalase activity, but in the presence of EDTA, all metal ions tested significantly inhibited catalase function.

Help Received
My parents and teacher helped edit my report; I used lab facilities at Accugent Laboratories; AM Chemicals provided some metal salts.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)

Asimina S. Courelli

Project Number

J0404

Project Title

Exploring Protein Similarities with Bioinformatics Tools to Establish Reasonable Animal Models for Disease Research

Abstract

Methods/Materials

A web browser enabled personal computer with internet access via a residential DSL line was used to access publicly available bioinformatics databases and tools. The OMIM (On line Mendelian Library) was used to find proteins associated with specific diseases, the NCBI protein/gene bank/database was used to find the amino-acid sequence of the selected protein, NCBI's BLAST tool was used to search for homologs in other species, ClustalW, a sequence alignment tool, was used to compare results of BLAST in greater detail, and the Pfam database was used to analyze conserved protein domains.

Results

The proposed procedure was employed to investigate candidate animal models for two diseases: Long QT Syndrome (LQTS) and Parkinson's disease. The protein associated with the most prevalent LQT gene (LQT1) was chosen for LQTS and alpha-synuclein was chosen for Parkinson's disease. Analysis of LQT1 revealed three significant domains associated with ion channels that were conserved across several species even in the fruit fly. Analysis of alpha-synuclein revealed one domain conserved across several species as well. However, the domain was not conserved in evolutionary lower species to the extent that LQT1 was.

Conclusions/Discussion

Several diseases have been linked to the production of defective proteins at the cellular level that can be found in humans and other evolutionarily lower species. Exploration of protein similarities and identification of conserved domains across the evolutionary tree can assist in understanding the evolution of a disease across species and in establishing reasonable animal models for researching a disease. This science project introduced a procedure and a set of publicly available bioinformatics tools to achieve this, employing the power of existing knowledge as it has been coded and stored in national and international resources which are available practically to anybody with access to the public internet. The proposed procedure is presented as a complement to experimental procedures in improving the quality and expediting the timeframe of the research process. It is worth noting that as the tools and the algorithms evolve, and as the databanks increase in content and improve in accuracy, the results of such electronic searching and result processing will become more thorough, more significant, and more important.

Summary Statement

The objective is to establish reasonable animal models for disease research using publicly available bioinformatics databases and tools.

Help Received

I would like to thank my parents for their advisement, their help with the presentation, their editorial suggestions, importing and placing the figures, and their financial support; and my brother Hristos Courellis for his help with correcting computer and communication related glitches when they appeared.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Kalista E. De Hart

Project Number
J0405

Project Title
Are You Getting the Energy You Need?

Abstract

Objectives/Goals
The objective is to determine if proteins, when compared to carbohydrates and fats, will produce the most heat energy. I believe that proteins will produce the most heat energy.

Methods/Materials
I created a calorimeter using a large coffee can, a small tin can, a pencil, a cork and needle, and a can opener. Other materials used included a beaker, distilled water, a thermometer, a calibrated gram measurement scale, safety glasses, a lighter, and three food samples from each food category. Food samples were ignited and allowed to burn, heating the water in the small tin can that was resting in the coffee can. Each sample was weighed before and after burning. Water temperatures were taken prior to and after burning food samples. After analyzing the data, I then determined the increase in water temperature in Celsius times the mass of the water, in grams, which gave me the amount of energy captured by the calorimeter in calories.

Results
Results indicated proteins stored the most chemical energy when compared with carbohydrates. Each food sample for each trial in the protein category released more heat energy than each carbohydrate sample. I was unable to burn fats as all samples I attempted to burn melted. They would not ignite and sustain a flame, thus, I could not measure a change in water temperature for those items.

Conclusions/Discussion
The results of my experiment support my hypothesis that proteins produce more heat energy than carbohydrates. As stated earlier, I could not include fats in my results. This information is important in the area of chemistry as scientists and medical researchers might explore how energy keeps the brain and body working efficiently. Also, scientists involved in medical, pharmaceutical, and nutritional research could examine how cells break down and use different types of foods in our bodies. This is important in a country where weight and food issues have become a concern.

Summary Statement
This project#s focus was to use a calorimeter to determine how much food energy is stored in different types of food by determining which food source would produce the most heat energy.

Help Received
Science teacher, Sharon Kilkenny, provided calibrated scale and beaker, friend, Grace Kumaishi, assisted in double checking results, mother, Kathleen De Hart, assisted with board layout and discussion of science experiment.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Maya A. Desai

Project Number
J0406

Project Title
Sugar Overload!

Abstract

Objectives/Goals

GOAL: I chose 'Sugar Overload' because I wanted to find out if eating sugary cereals such as Fruit Loops would raise your blood sugar anymore than eating less sugary cereals such as Cheerios.
HYPOTHESIS: I believe sugary cereal such as Fruit Loops will raise a person's blood sugar more than other cereals such as Cheerios.

Methods/Materials

METHOD/PROCEDURE:
Step 1: Using the Glucometer, test and record the morning blood sugars of 2 subjects before and 30 mins after eating Cheerios (5 times)
Step 2: Repeat 5 trials with Fruit Loops.
MATERIALS:
Ten 1 cup servings of Cheerios & Fruit Loops
20 half cup servings of Low Fat Milk
Measuring cups for solids & liquids, cereal bowls, spoons
Glucometer, 40 alcohol pads, test strips, lancets

Results

I did a total of 20 trials (5 per cereal per subject).
Summary of raw data:
Subject 1- Cheerios- Average change in blood sugar--34.6
Subject 1- Fruit Loops-Average change in blood sugar--40.8
Subject 2- Cheerios-Average change in blood sugar--28.8
Subject 2- Fruit Loops-Average change in blood sugar--34.8

Conclusions/Discussion

After evaluating my data, I conclude that sugary cereals such as Fruit Loops do not raise your blood sugar in the short term anymore than Cheerios. My experiment proved my hypothesis incorrect, but I learned that in the long term, sugary cereals can eventually cause many health problems.
My research has many real world applications. Based on my experiment, kids and parents do not need to worry that eating sugary cereals once in a while will cause sugar highs or other short term problems. However, people should think about the possibility that sugary cereals can cause the body to eventually fail to regulate sugar levels properly.

Summary Statement

My project is about comparing blood sugars levels after eating Cheerios and Fruit Loops.

Help Received

Mother helped get glucometer. Father helped print graphs.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Blair E. Gelb

Project Number
J0407

Project Title
Orange Juice Makes My Stomach Ache

Abstract

Objectives/Goals
The purpose of this study was to test the pH of orange juice and to determine if it is more acidic than my other favorite beverages.
My goal is to learn about the stomach and the impact of acidic beverages to it.

Methods/Materials
The independent variables in this study that I used were the eight different beverages tested. The dependent variables were room temperature and the pH strips. I poured 3 ounces of each beverage into small bowls. Then, I dipped blue litmus paper into each bowl for 5 seconds. I looked for a reaction (red-acid, blue-neutral) and compared litmus paper colors of each liquid. Follow the same procedure using Baker pHIX test strips (pH 0.0-14). Dip the test strips into the test liquids for 5 seconds and compared results to the color chart on the box.

Results
The litmus paper had limitations because it was hard to tell the variations in red color.I listed the results by the red shading I saw. I ran this experiment twice and the results were the same. After searching, I was able to find numbered pH test strips. This was also a limitation because they only measured pH in1.0 increments, for example; 1.0, 2.0, 3.0. I ran this test twice and these results of this test were the same.

Conclusions/Discussion
I learned many interesting facts about the stomach and the pH of beverages. My research suggests that the low pH of orange juice can cause the stomach to overproduce acid which can lead to a stomachache. By doing my experiments, I found that when using the litmus paper all the beverages turned the litmus paper shades of red in which I had to guess the results. The pHIX test strips allowed me to see the pH differences between the beverages which ranged from 2.0 to 6.0. Orange juice has a pH of about 3.0, but lemonade has a lower pH of about 2.0 when all of my other favorite beverages had a higher pH which makes them less acidic. My results support my hypothesis except for the pH of lemonade. Also, not every child will get a stomachache from orange juice and each case needs to be looked at individually. Finally, I have decided to still drink orange juice, but not as much at one tim, and I will make sure it is not on an empty stomach.

Summary Statement
In my project, I tested the pH of beverages to determine the acidity compared to Orange Juice.

Help Received
Some help from parents for research, typing, and formatting of the presentation board, test strips from my dad's work.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Samantha M. Guhan

Project Number
J0409

Project Title
Stevia: Sugar's Ultimate Competitor

Abstract

Objectives/Goals
This study focused on sweet glycosides found in the leaves of Stevia rebaudiana. The purpose of the first experiment was to determine the role of surface area of leaves and temperature of water when extracting glycosides. The second experiment addressed glycoside distribution in leaves as a function of age and flowering stage to test the hypothesis that biosynthesis of glycosides may not be growth related. The possibility of developing an assay at 651nm was also explored.

Methods/Materials
Three transplants of Stevia rebaudiana were grown. In the extraction experiment, fresh whole, fresh shredded, and crushed dried leaves were steeped in cold, room temperature and hot water. Samples were taken at times ranging from 5 minutes to 24 hr. In the distribution experiment, samples of leaves were taken from a young branch, from various levels along a sideways flowering stalk, from two dominant stems before and after flowering and extracted in hot water. All samples were appropriately diluted and their absorbance measured at 210nm and 651nm. Standard solutions were made from commercially available stevia powder.

Results
The results from the extraction experiment indicate that surface area of leaves is critical in determining final glycoside concentration and speed of extraction. When surface area is limited, the higher the temperature of water, the better the extraction. The distribution experiment results support the hypothesis that glycoside biosynthesis is not growth related. Data verify that glycoside content varies with leaf age, with younger leaves having the least amount. In contrast to literature, middle leaves had the highest glycoside concentration while glycoside content in young leaves increased after flowering. A relevant assay at 651nm could not be developed since absorbance values at 210nm did not correlate with those obtained at 651nm.

Conclusions/Discussion
This study has raised many questions. Is 210nm the best wavelength? Why does the absorbance at 210nm not correlate with that at 651nm? Some absorbances and stevia yields were higher than expected implying presence of other compounds, whose interference must be accounted for. Since some of the observed trends differ from literature, such as doubling of glycoside concentration in younger leaves after flowering, the experiment needs to be repeated. If correct, this could change harvest time from before to after flowering!

Summary Statement
This project addresses extraction efficiency, leaf age based distribution and a potential assay for glycosides found in the leaves of the plant Stevia rebaudiana.

Help Received
Used UV-vis spectrophotometer and analytical balance at Amgen Inc. under supervision of Dr. Kaltenbrunner; mother gave general guidance.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Kathleen P. Hennessy

Project Number
J0410

Project Title
CSI: San Mateo

Abstract

Objectives/Goals
The objective of my project is to confirm that DNA Fingerprinting can really uncover the perpetrator of a crime. I will see if DNA Fingerprinting can distinguish between very close family members who have similar DNA sequences.

Methods/Materials
As a test, a mock crime scene was created. I extracted DNA from the blood samples of six suspects. The polymerase chain reaction method (PCR) was used to amplify sixteen genetic markers, including the sex identification marker, so they could be detected. The samples were then run on a capillary electrophoresis instrument to separate and detect the DNA fragments. Using software to analyze the data, I was able to see who the criminal was and if my hypothesis was correct.

Results
DNA profiles were obtained from all suspects. Three controls were also executed. The positive control reassured me that the PCR reaction and DNA extractions worked. The no template control and FTA negative control proved that nothing was contaminated.

Conclusions/Discussion
I concluded that DNA Fingerprinting performs very well and can even tell apart family members who have very close DNA patterns. Amazingly, DNA Fingerprinting also enables you to recognize your mother or father so you can prove that they are your real parents.

Summary Statement
My project demonstrates that DNA Fingerprinting can be used to distinguish individuals and family members.

Help Received
Used lab equipment at Applied Biosystems under supervision of my mother, Lori Hennessy.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Alex K. Hunter

Project Number
J0411

Project Title
Can Liquid Crystals Be Absorbed by Organisms and Be Used as a Biological Stain to Measure Thermal Activity?

Abstract

Objectives/Goals
The purpose of this project is to investigate the use of Liquid Crystals (LC's) as a method for biological staining. The unique properties of these pigments cause them to change colors at different temperatures. This project addresses two questions: 1) Can LC's be absorbed into cells as a new staining technique, 2) Can this provide us with information on heat sensitive processes occurring in cells.

Methods/Materials
1) Obtain LC supplies & solvents. 2) Research & test which solvents will dissolve LC's. Water, alcohols, & other organic solvents will be tested. 3) Make cultures & slides of Paramecium, Euglena, & rabbit psoa muscle fiber. 4) Stain each sample using the LC's in varied concentrations. 5) Analyze results of the following a. Analyze absorption of LC's into Paramecium and Euglena & if possible analyze the phototaxic response. b. Action of ATP in muscle fiber contraction in Rabbit Psoa muscle fiber. 6) Use other techniques for loading macromolecules into the cytoplasm of cells including hypoosmotic shock, scrape loading, & agitation in cold. 7) Manipulate the temperature conditions to see if the dyes change colors within the stained cellular samples. 8) Determine if thermal activities can be monitored with absorbed liquid crystals. 9) Analyze the data, & research professional scientists & data bases to determine if there could be any uses for these new staining processes. 10) Aseptic technique will be used and proper disposal will be followed.

Results
The liquid crystals are mostly non-polar in nature. T-butyl alcohol was the only solvent that we tested that could dissolve the LC's & mix with water. An 86% t-butyl alcohol/water mix was the most dilute solution possible for basic osmotic transfer of the LC's. This concentration was too high for the Paramecium and Euglena to survive. The rabbit muscle fiber coated in LC's did change color when ATP was added. LC absorption by ingestion was inconclusive. Other techniques for loading LC's s into the cytoplasm will be tested.

Conclusions/Discussion
The non-polar nature of LC's makes the process of loading them into cytoplasms difficult via osmosis due to the polar nature of water. It was difficult to control light & heat with microscopes being used to measure the thermal activity of the organisms. Indirect lighting sources may be more suitable for future investigations.

Summary Statement
Liquid Crystals were tested to see if they could be used to stain organisms & measure their thermal activities.

Help Received
My father supervised the project. He helped to gather necessary materials and equipment and supervised experiments in his classroom. My mother helped in typing and putting together of the project board.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Jung Hun Koh

Project Number
J0412

Project Title
Effect of Salt on Protein Denaturation in Egg Yolks: Measuring the Change of Rolling Time

Abstract

Objectives/Goals
The objective was to determine whether the egg protein would coagulate in saline solutions and whether there would be a difference in rolling time as a result of this coagulation.
The hypothesis was that the coagulation of eggs and the rolling time will be both affected by the concentration of the salt solution they were in. The hypothesis is based on the process of denaturation by salt.

Methods/Materials
A brief procedure of the experiment is the following. The eggs, some numbered and some unnumbered, are put into 0%, 5%, 10%, 15%, and 20% salt solutions. Every other day, the numbered eggs are rolled on a slide of length 306.3cm and 15-degree slope, and the rolling time is measured and recorded in seconds. Every four days, one of the unnumbered ones is taken out from each solution, broken, and observed for any changes.

Results
The results support the hypothesis. As the days passed, the total average of the rolling time, excluding the control group, decreased from 5.33 to 4.59 seconds. From observation, the egg yolks in saline solutions of higher concentration were found to start coagulating around day 10. The slope, or the relative changes of rolling time, measured since day 10, varied according to the concentration such that the solutions with higher salt concentrations had greater slope, i.e., the 20% solution had the slope of 0.03 while the 0% only had 0.0025.

Conclusions/Discussion
Thus, when the egg was put in saline solution, the rolling time decreased while the observation showed the solution with greater concentration enabled faster coagulation, proving that the salt coagulated the egg.

Summary Statement
This experiment observed egg yolks being coagulated under saline water conditions and measured rolling times to verify the results.

Help Received
Parents helped in purchasing materials and measuring rolling time.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Filipp Kozachuk

Project Number
J0413

Project Title
The Effect of Temperature on Reaction Rates of Amylase and Starch

Abstract

Objectives/Goals
The objective of this experiment was to gain a greater understanding of how amylase breaks down starch. I wanted to learn how our body uses saliva and pancreatic juice to break down food. I also wanted to see how temperature affects the reaction rates of amylase and starch.

Methods/Materials
Testubes were filled with starch and amylase. Once the iodine was inserted, I started a timer for one minute. Once at one minute, I put in iodine to stop reaction. Then I diluted with water and placed in Spectrophotometer and took reading. Each trial was brought to its initial temperature before testing of 1,5,22,37,65, and 100 °C.

Results
The reaction rates of amylase and starch increased as the temperature increased. The absorbance levels of the starch decreased as the temperature increased. However, after the 65-degree trial, the reaction rates started to decrease and the absorbance levels increased. This was due to the amylase denaturing and the fact that the iodine couldn#t bond with the starch at such a high temperature.

Conclusions/Discussion
My conclusion is that the hotter the temperature of the amylase-starch solution, the faster it breaks down. It is also that at hotter temperatures, the body breaks down starch (food) faster.

Summary Statement
Testing how temperature affects the reaction rates of amylase with starch

Help Received
Used lab equipment at UCSB under the supervision of my mentor, Sean Bignami

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Eugene Laksana

Project Number
J0414

Project Title
How Does Calcium Affect Your Bones and Health?

Abstract

Objectives/Goals
The project's goal is to show what happens to bones that get too much calcium, too little, just enough, or none at all.

Methods/Materials
Materials: jars, cooked chicken bones, masking tapes, gold scale, vinegar, water, calcium tablets, paper, measuring cup, scissors, knife.
Methods: Get six cooked chicken bones each weight about the same. Label each jar from 1 to 6. Fill each jar with its contents: Jar 1 - water, Jar 2 - vinegar, Jar 3 - vinegar and one calcium, Jar 4 - vinegar and two calcium, Jar 5 - vinegar and three calcium, Jar 6 - vinegar and four calcium. Put one bone in each jar. Observe the bones' characteristics for about two weeks. Test the bones' strengths with hands and knife.

Results
Bone 1 was the strongest, bone 2 was the weakest, bone 4 was the strongest one in calcium.

Conclusions/Discussion
Bone 1 was the strongest since vinegar destroyed the rest of the bones (bones 2 to 6). However, bone 4 was stronger than the other calcified bones because it got the right amount of calcium. Too much or too little calcium will damage your bones.

Summary Statement
The project is about the affect of calcium on your body, health, and bones.

Help Received
Mother helped arrange the report; Father, Mark & Melani Soendjojo helped follow the procedures; Mr. Cummings helped understand the project's concept; Fang Ing Tan helped design the backboard display; Meghan Anderson helped understand the notebook.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Hana Lemseffer

Project Number
J0415

Project Title
Today without Chlorophyll

Abstract

Objectives/Goals
The objective of my project was to determine which plant contains the most chlorophyll. I believe that Pine leaf contains the most chlorophyll and Banana tree leaf contains the least.

Methods/Materials
150 grams of seven different types of leaves (Oak, Citrus, Ivy, Eucalyptus, Pine, Couch Grass, and Banana tree leafs) were each grinded to a pulp and washed out with 80 grams of 70% rubbing alcohol to extract the chlorophyll. The weight of the dry residue was calculated and compared between each result from the different leaves.

Results
Each of the 15 samples of the Eucalyptus leaves was found to be significantly greater than any of the other leaves, while the pine leaves contained the least amount of chlorophyll.

Conclusions/Discussion
My conclusion is, since Eucalyptus leaves were found to contain the most chlorophyll out of the studied leaves; I recommend that people plant Eucalyptus trees in their yards and around their cities in order to counter-balance the growing problems of pollution.

Summary Statement
I measured the amount of chlorophyll contained in seven different types of leaves.

Help Received
My parents helped me retrieve my leaves.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Varun K. Rau

Project Number
J0417

Project Title
How Vulnerable Is DNA?

Abstract

Objectives/Goals
My project involves extracting DNA from onions, apples and bananas and to study the effects of various stimuli on the extracted DNA.

Methods/Materials
Procedures: 1. Pour 120 ml of bottled water into clean glass container and add 1.5 grams of table salt and 5 grams of baking soda. 2. Add 5 ml of laundry detergent with the baking soda, salt, and water. 3. Chill the buffer to slow DNA degradation. 4. Chop the plant matter into small pieces. 5. Pour 10 ml water into the blender with the plant matter and pulse. 6. Take out 1 tablespoon of the material and put it into a plastic container. 7. Put 2 tablespoons of the chilled buffer into the plastic container with the material and stir. 8. Place nylon stocking on another plastic container. 9. Pour all the fruit/vegetable mixture through the nylon-covered container. 10. Put 5 ml of the result into the test tube. 11. Put 5 ml of the Isopropyl Alcohol into the test tube very slowly. You will see DNA! 12. Place the test tube into a pot of water and depending on the test either boil the water or just keep the water at room temperature OR put the chemical into the test tube and observe. 13. Record results.

Materials: 4,600 ml of bottled water; 45 grams of salt; 150 grams of Baking Soda; Crushed ice; 6 bananas, apples and onions; Isopropyl (rubbing) alcohol; A test tube; Knife; Blender; Stirrer; Detergent.

Results
The results showed that the vulnerability of the DNA to different stimuli varied based on the source of the DNA as well as the kind of stimuli used.

Conclusions/Discussion
After I finished my experimentation, I came up with some astonishing results.
I have concluded that different stimuli have differing affects on DNA degradation that was as I had hypothesized. However, contrary to my hypothesis, banana DNA is the least vulnerable to household chemicals, Onion DNA is the second most vulnerable and apple DNA is the most vulnerable suffering significant degradation.

Summary Statement
My project is about the extraction of DNA from different plant sources and assessing its vulnerability to different stimuli.

Help Received
My mother allowed part of the kitchen counter to be converted to a lab for the duration of the project. My father provided continuous support and Mr. Fleck my coach advised and encouraged.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Allison P. Reed

Project Number
J0418

Project Title
Can I Clone the Normal GM-CSF Gene Out of My Dog's Tumor?

Abstract

Objectives/Goals
Last year I found multiple DNA mutations in my dogs tumor p53 growth control gene. This year I looked for mutations in the critical GM-CSF immune cancer fighting gene in my dogs tumor RNA. If my dogs tumor GM-CSF gene was mutated, perhaps her immune system was weakened and could not fight her cancer. If her tumor GM-CSF gene was normal, maybe it was expressed at low levels.

Methods/Materials
A)Genomic Dog tumor DNA/RNA isolation.
B)The Dog GM-CSF gene was amplified using polymerase chain reaction (PCR) and ligated into a sequencing plasmid.
C)The Dog GM-CSF PCR amplified gene was sequenced.
D)The sequence data was analyzed using Sequencher software and electronically compared to the normal dog GM-CSF gene sequence.

Results
I was able to use RT-PCR to amplify the Dog tumor GM-CSF gene and clone it into a sequencing plasmid.The sequence data for my cloned Dog GMCSF gene is clear and strong and shows no mutations.

Conclusions/Discussion
Last year I found multiple DNA mutations in my dogs tumor p53 growth control gene which explained her tumor growth. This year I find no mutations in her tumor immune cancer fighting GM-CSF gene. Her immune system must have been fighting her cancer since GM-CSF was expressed, but maybe not expressed high enough. Perhaps I can put the normal GM-CSF in a high expression plasmid and use it as a cancer fighting vaccine for other Dogs Cancer in the future.

Summary Statement
Clone a cancer fighting gene from my dogs tumor.

Help Received
My Science Advisor, Science Supervisor and Mother all provided useful and appropriate guidance.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Wyatt H. Spence

Project Number
J0419

Project Title
Does the Type of Container Affect the Amount of Vitamin C in Orange Juice?

Abstract

Objectives/Goals
Vitamin C or Ascorbic acid is an important nutrient that keeps your body healthy. Ascorbic Acid is a water soluble vitamin that can be destroyed. The way foods are stored could affect whether or not the vitamin is protected. Containers that protect the vitamin from light like cardboard may keep more Ascorbic Acid in the food. Orange Juice is one of the best sources of Ascorbic Aid. It is possible that a transparent container like glass could let in enough light to destroy some of the vitamin C. In this project I compared opaque and transparent containers to see if they would affect the amount of Ascorbic Acid remaining.

Methods/Materials
In this project I tested 100 samples of Fresh Squeezed Orange Juice. Fifty 1 ounce samples in opaque containers. Fifty 1 ounce samples in transparent containers. I let these samples sit in a Household Refrigerator under normal use by a family of 4 for 7 days. I tested the samples for Ascorbic Acid content using a titration method. A starch solution was added to each sample. When the iodine was added it reacted with the Ascorbic Acid and resulted in de hydro ascorbic acid. This has no color. When the Ascorbic Acid ran out, the iodine reacted with the starch in the juice and the juice turned a blue color. When the juice turned blue, that was the endpoint. I counted the number of drops of iodine that had to be added. The more drops of Iodine, the more Ascorbic Acid. My Independent variable is the type of Container, and the dependent variable is the amount of Ascorbic Acid that is left in the Orange Juice.

Results
The results of my testing revealed it took 20 drops on average for the Transparent container to change, and It took 30 drops on average for the Opaque container to change. The Opaque container retained 33% more Vitamin C than the Transparent container.

Conclusions/Discussion
These results support my hypothesis That an opaque container would retain more Vitamin C. This information could be very useful to the consumer.

Summary Statement
In this project I revealed that purchasing Orange Juice in an opaque container could retain 33% more Vitamin C than a transparent container.

Help Received
My mother purchased the supplies I needed.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Joshua Wong

Project Number
J0420

Project Title
Effects of Different Strains of Yeast on Rate of Fermentation and Wine Flavor

Abstract

Objectives/Goals
The objective is to investigate whether the rate of fermentation and the wine flavor are affected by different strains of yeast.

Methods/Materials
Two different yeast strains of S. cerevisiae 71B-1122 and K1-V1116 (1.16 g. and 0.5g) were inoculated into 9oz 100% Dole pineapple juice and 100% Welch grape juice to determine their rate of fermentation at 20C. The control samples had no yeast. The pH of each juice was measure before inoculation and after fermentation was completed. Hydrometer was used to measure the brix, and the potential alcohol content. When the brix read 0%, the fermented juice was transferred to the refrigerator for a day before it was racked into another sanitized bottle. Ten people using Davis Score chart conducted sensory evaluation. The results determined which yeast produced a more desirable flavor.

Results
S. cerevisiae K1-V1116 fermented faster in pineapple juice, whereas the strain 71B-1122 fermented faster in white grape juice. The strain K1-V1116 produced more froth during fermentation in both juices. Both strains of yeast produced the same average pH 3.52 in wine fermented from pineapple juice. The strain 71B-1122 produced a lower average pH 3.78 than the strain K1-V1116 with an average pH 3.81.

Conclusions/Discussion
The yeast strain K1-V1116 produced higher desirable flavor ratings in wine from both juices, even though the rate of fermentation and pH varied.

Summary Statement
Different strains of yeast affect the rate of fermentation and the wine flavor in different juices.

Help Received
Mother helped in wine tasting with the neighbors, and Ph measurements in FSU enology lab.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Olivia E. Wong

Project Number
J0421

Project Title
Effects of the Extracellular Fluid Tonicity on the Volumes of the Living Cells

Abstract

Objectives/Goals
The cell volumes will change depending on the tonicity of the ECF (Extracellular Fluid).

Methods/Materials
U-tube experiment demonstrates the concepts of simple diffusion of water movements across the semipermeable cell membrane via the osmotic gradient. Human cells (red blood cells and buccal mucosal cells) and plant cells (onion cell) are challenged by different tonicities of ECF.

Results
In U- tube experiment, 0.9 Normal Saline (left side of U-tube) versus 3% sodium chloride (hypertonic) (right side of the U-tube), water will move from higher water concentration (0.9 Normal Saline) to lower water concentration (3% sodium chloride) across semipermeable membrane. Opposite direction occurs in 0.9 Normal Saline versus distilled water (hypotonic). Cell volumes do not change in isotonic ECF, but increase in hypotonic ECF and decreased in hypertonic ECF. The plant cells exhibit "turgid state" in hypotonic ECF and "plamolysis" in hypertonic ECF due to the rigid cell wall in plant cell.

Conclusions/Discussion
The cell volumes will change inversely to the ECF tonicity. This project can be applied to preservation of meat, fish, and vegetables with salt and the use of different Intravenus fluid for fluid resuscitation to dehydrated patients.

Summary Statement
Effects of Extracellular Fluid tonicity on the cell volumes are researched.

Help Received
I sincerely give thanks to Mrs. Griego for providing me with necessary information. Secondly, I thank David Wong for editing my work. Lastly, to San San Wong for her assistance in visual display.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Hira Zia

Project Number
J0422

Project Title
A Very Juicy Experiment: The Effect of Pectinase, Cellulase, Amylase, and Their Immobilization on Apple Juice Production

Abstract

Objectives/Goals
My project was divided into 3 different experiments. Experiment 1- the effects of pectinase, cellulase, and amylase on apple juice production. Experiment 2- the effects of enzyme combinations on apple juice production (pectinase and cellulase, pectinase and amylase, cellulase and amylase). Experiment 3 part 1- the effects of immobilized enzymes on apple juice production, Experiment 3, part 2: the effects of reused immobilized enzymes on apple juice production.

Methods/Materials
Method:
For each experiment, cut one apple, divide it equally into 4 parts, and place each quarter into a beaker. Experiment 1- apply enzymes (one to the contents of each beaker) and distilled water to the forth one (control). Filter the juice into the test tubes, and recorded the results. Experiment 2- combine the enzymes (pectinase and cellulase, pectinase and amylase, cellulase and amylase) and apply the combinations to the contents of each beaker,distilled water to the last one. Filter the juice, and record the results. Experiment 3- immobilize the enzymes using calcium chloride and sodium alginate, and apply the immobilized beads to each beaker. Filter the juice, and record the results. Separate the beads from the apple waste, and reuse them.
Materials:
pectinase, cellulase, amylase, distilled water, apples, beakers, testing tubes, a balance, sodium alginate, calcium chloride, a syringe, a tea strainer, timer, stirring rod

Results
Experiment 1- pectinase: 4.2 mL, cellulase: 2.4 mL, amylase: 1.9 mL, distilled water: 0 mL; Experiment 2, trial 1- pectinase and amylase: 4.3 mL, pectinase and cellulase 4 mL, cellulase and amylase: 2.2 mL, distilled water: 0 mL; Experiment 2, trial 2: pectinase and cellulase: 5.7 mL, pectinase and amylase 5.5 mL, cellulase and amylase 1.5 mL, distilled water: 0.1 mL; Experiment 3, part 1- immobilized pectinase: 2.5 mL, immobilized cellulase: 1.4 mL, immobilized amylase: 0.6 , distilled water: 0 mL; Experiment 3, part 2- pectinase: 0.3 mL, others didnt produce any juice.

Conclusions/Discussion
The outcome of my first experiment supported my hypothesis (pectinase was the most effective); my second hypothesis was not fully proven correct (trial 1: pectinase and amylase was most effective, trial 2: pectinase and cellulase was most effective); and my third hypothesis was also proven correct (I was able to immobilize and reuse the enzymes. The immobilized enzymes weren't as effective as the enzymes

Summary Statement
The effects of pectinase, cellulase, amylase, and their immobilization on apple juice production.

Help Received
My mother guided me throughout my project; Mrs. Shela Jawaid helped find and order the enzymes needed to conduct my experiment