

The background of the image shows a science fair display. It consists of several white shelves holding numerous clear glass beakers. Each beaker is secured to the shelf with a green fabric ribbon. The ribbons are tied in various ways, some forming loops or bows. The overall scene is brightly lit, and the green ribbons provide a strong contrast against the clear glass and white shelves.

**Midwood
High School
Research
Program
Science Fair
2014**



2014 Midwood High School Science Fair

29 May 2014 — 3:30 to 5:30 PM

Michael McDonnell — Principal
Tovia Rosenfeld — Assistant Principal
Glenn Elert — Research Coordinator
Jennifer Sullivan — Research Teacher
Jessica Ross — Research Teacher
Jesse Roerich — Research Teacher
Shaniece Mosley — Research Teacher

Timeline

Period 3–9

Sophomores park boards in A214 (Research Room)

Sophomores deliver snacks, drinks, plates, etc. to A300 (Physical Science Office)

1:40 PM (Period 9)

Junior and Senior judges congregate in library

Junior and Senior tasks are explained

Junior and Senior judging packets distributed (time to read abstracts)

2:30 PM (Period 10)

Scheduled classes on 3rd floor annex moved to main building

Junior and Senior judges perform assigned tasks

Judges use assignment packet as ticket for food in A313 (Physics Lab)

Guest judges arrive and pick up judging packets from Mr. Elert (3:00-ish)

3:20 PM (Period 11)

Sophomores move to assigned rooms, boards already in position

Sophomores given time to make adjustments to boards and self

Judging begins at 3:30

4:30–5:30 PM

Judges return to A214 (Research Room) with completed packets (calculators available)

Juniors and Seniors assist with clean up

Sophomores return boards to A214 (Research Room)

Sophomore teachers provide students with color-coded food tickets

Sophomores allowed in A313 (Physics Lab) in groups of 20~30 by ticket color

Last call for food



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Judges

Alumni

Aleksandr Afanasyev, Aiysha Ashfaq, Ron Baazov, Roxana Bravo, Anna Chen, Matthew Chin, Olga Gulyayeva, Anna Guo, Irene He, Janae Headly, Arif Hussain, Munif Hussain, Yao Jiang, Mert Keceli, Jessica Khaimova, Maria Kofman, Stanley Krasner, Jasmine Lam, Kimberly Lau, Clarice Lee, Nicholas Lee, Wendy Lee, Judy Li, Winnie Li, Leo Liao, Dao Quan Lin, Pamela Liu, Tiffany Loi, Wenona Lok, Tiffany Lui, Gabrielle Lynch, Zoe Ma, Anastasiya Matveyenko, Humera Mohammad, Jenny Ng, Nicole Ng, Vivian Ng, Linda Ngo, Annie Nguyen, Whitney Nimitpattana, Lima Nusrat, Farhana Pinki, Ziva Rubinstein, Ifrah Saleem, Zainab Saleem, Nima Simon, Crystal Soo, May Sy, Sophia Tse, Evelyn Veliz, Zhao Na Wang, Klaudia Wojciechowska, Kate Wong, Vernon Wu, Emilee Yang, Amanda Ye, Andy Yee, Wendy Yu, Prianka Zaman, Susan Zheng, Arlene Zhou

Teachers

Mary Bomba, Thomas Canepa, Elizabeth Fenamore, Kimberly Lau, W Tong Lung, Stephan Riemersma, Dr. Frank Grasso (Brooklyn College)

Seniors

Christopher Ayala, Shahodat Azimova, Aziza Babaeva, Allen Barbarovich, Yasmine Brown-Williams, Varvara Budetti, Alisha Bunting, Amy Cao, Bryan Chan, Xin Yi Chen, Sammi Chung, Leonidas Eracleous, Samuel Genchikmakher, Kharene Gittens, Ying Tong Guo, Tasnim Halim, Remi Henry, Stefanie Henry, Raquel Hosain, Shadika Jahan, Joel Jose, M Tasnin Kabir, Jasmin Kim, Cindy Li, Shirley Li, Jessica Liang, Ellysa Magloire, Tiffany Mai, Kiara Nunez, Chukwunonso Nwasike, Fionne Pham, Akeem Pinnock, Almas Shafiq, Adam Soliman, Jeffrey Tsui, Ashley Yip, Jonathan Yuen

Juniors

Muhammad Abdulla, Rolens Ambroise, Rosa Basevich, Charlynn Trish Ben, Hussain Bokhari, Aarin Chase, Colleen Chasteau, Cindy Chee, Vivian Cheng, Dina Deng, Michael Divgun, Valeriya Falkovich, Jacquelyne Gilman, Mohammed Hasan, Syeda Hillary, Jing Wei Hu, Xiaoyan Hu, Shanna Huang, Zainab Iqbal, Taulant Kastrati, Isheta Khanom, Melissa Lee, Lucy Lin, Sandra Lin, Marisol Morales, Meghan Ng, Monique Powell, Saba Sakhi, Patrice Sanderson, Carmine See, Emily Tung, Wenli Wang, Yukie Wong, Richard Wu, Jocelyn Yeung, Jessica Yip, Raymond Yu



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Participants

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| 318-04 Melisa Bivic Does coffee stain teeth the most? | 318-08 Quetourah Dalencourt & Brianna Guillaume Think fast! Think hard! |
| 319-05 Victoria Boateng & Tania Sadiq Meat + Soda = ? | 319-24 Hussein Fardous Whitening ability of different types of toothpaste |
| 316-04 Hareem Bokhari What disinfectant kills the most bacteria? | 316-08 Zachary Feinstein Mouthwash product testing |
| 320-09 Nadine Brewster Which food wrap preserves fruit the best? | 318-06 Eman Gad Exposure of baby food and the degree of contamination |
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- 319-17 Jinyan Huang
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Abstracts

314-02 Got milk?

Yusra AbdurRob

(Ross – Products)

In this experiment, the amount of plastic 0%, 1%, 2%, and 4% milks produces is investigated. The problem is which milk, 0%, 1%, 2%, or 4%, produces the most plastic? Instead of wasting milk that is expired, plastic can be made for useful accessories. Milk contains casein, molecules of a protein. When milk is heated and an acid is added to it, the casein molecules rearrange into long chains. The polymers that are made up of many of these casein monomers are connected together in a pattern. This allows it to be molded, causing production of plastic. There were 15 trials conducted for each type of milk. The procedure was heating 237 mL of one type of milk under 50% power for 2 minutes. Then the milk is measured with a thermometer to make sure it is at least 49 °C. 39 mL of vinegar is measured and added to the heated milk. The solution is mixed and poured into a filter paper so the precipitate, known as curd, is filtered out. The curd is then kneaded like dough and measured using a scale. This procedure is repeated until all 15 trials are completed and then repeated for the other milks. My hypothesis was that 4% milk will produce more plastic. 4% milk had the largest average. The anova p value was 7.88E-40. The t-test values were 3.6E-15, 3.12E-10, 1.92E-10, 3.03E-05, 2.18E-09, and 1.57E-36. This shows there is significance in data and that 4% milk produced the most plastic.

314-11 The effects of microwave radiation on the growth of E. coli

Mie Abouelkheir

(Sullivan – Microbiology)

E. coli, a bacterium that can be fatal if consumed, is found on certain foods, and in the environment. However, the useful strand of E. coli is found in humans' digestive system and is beneficial in the digestive process. Often times than not, microwaves are used in heating our food by emitting electromagnetic waves. This project describes the effect of microwave radiation on the growth of E. coli. After growing the E. coli bacteria, one must establish set times in which the bacteria will be placed in the microwave. Preferably starting from zero seconds (control) and increasing by two second intervals. Label the agar plates by dividing off four sections in which one is labeled the control. Use a cotton swab, dip into the bacteria and spread in a zig-zag formation on the designated spot. Incubate overnight at 37 °C. Once completing multiple trials, the results were the following: 2 seconds, growth; 4 seconds, growth; 6 seconds, growth with colonies; 8 seconds, growth with fewer colonies; 10 seconds, no growth; 12 seconds, no growth. The results were as predicted. This is crucial in understanding how much time it takes for our food to be 'ready' when using a microwave. By heating food, it is important to put it in the microwave for the designated amount of time that a label had advised, no more, no less.

314-16 Color's effect on memory

Abbosbek Adxamov

(Roehrich – Behavior)

Memory is the storing and remembering of environmental information. Part of our brain that is in charge of visual memory is the right temporal lobe which will be mainly used for this experiment. We are humans and we all forget things but this is because the information wasn't stored properly not that there's anything wrong with our brain. It could be that it wasn't important enough or it was so traumatic that our brain suppressed it. There have been previous experiments similar to mine which is to see if color affects memory. They have found that more people tend to remember more words in color although my hypothesis was that brighter colors would be memorized more than any other colors and the control. My procedure was to place the flashcard with SAT words written on them in front of the test subject and give them two minutes to memorize the words. After two minutes I collected the words and gave the test subject a blank sheet of paper to jot down as many words as they could remember. They were given two minutes for this part also. Lastly the sheets were collected and the data recorded. Looking at the raw data there were more people who memorized the words on the white flashcards on average which was the control group. Although, t-test showed that there wasn't a significant difference between the control and the brighter colors. In conclusion my hypothesis was supported that brighter colors would be memorized more than the other colors.

320-02 Is the speed of light truly constant?

Laila Akallal

(Ross – Physics)

The purpose of this experiment was to measure the speed of light through various substances, (water, alcohol, oil, green Jell-O, salt water, cube) in order to determine which medium light travels fastest through. It was predicted that light would travel fastest through water compared to the other media. In order to find the speed of light for a medium, Snell's Law and the Refractive Index formula are used. While conducting this experiment, a laser is pointed through the center of each substance at ten different angles. The angle of refraction and inclination are then measured for each of the ten trials. After that, these angles are plugged into Snell's Law to receive the refractive index of that substance; this refractive index is then plugged into the Refractive index formula to determine the speed of light for that substance. The known refractive index of light in air (1.0003) and the speed of light in air (299,792,458 meters/sec.) are used in the formulas and remain constant with all calculations. The major finding of this experiment is: the speed of light in water averaged out to be 231,272,110.2 meters/sec, which compared to the other substances, is the closest to the speed of light in air. From the evidence, it can be concluded that the predictions made were correct and light traveled fastest in the water. This shows, measuring the speed of light does not take expensive equipment and can be done with a simple laser pointer and protractor.

320-20 The effect of acidic citrus fruits and skin tone on henna stain

Samera Arif

(Sullivan – Biochemistry)

In my experiment I tested to see if acidic citrus fruits and skin tone effect henna staining. The purpose of my experiment was to find a natural solution to achieving dark henna stain, chemical free. For my experiment I used 4 acidic fruits, lime, lemon, grapefruit, and orange. I used water for my control. I mixed henna powder with sugar and essential oil. To each mixture i added about 12 tsp of the juices. I let the mixture sit, covered, overnight. The next morning I coned the mixtures, for easy application. I applied similar henna designs on myself and a variety of skin tones, from light to dark. The henna paste was left on overnight and avoided water. Results showed henna mixed with lime and lemon juice stained darkest on everyone. While water mixed with henna was a discrepancy, in that it stained darker than henna mixed with orange on some skin

tones. In conclusion, henna powder mixed with sugar, essential oil and a juice with low acidity, such as lime juice, will produce the darkest natural stain.

318-19 The effects of home remedies and medication on cholesterol

Alexandra Auteri

(Roehrich – Cellular)

In my experiment I tested the effects of cholesterol-lowering home remedies and medication on animal fat. The purpose of this is to see the most effective way to lower cholesterol. If home remedies are most effective when lowering cholesterol we can eliminate dangerous cholesterol-lowering drugs and use healthier methods to lower cholesterol levels. To test these different ways to lower cholesterol I had animal fat represent cholesterol in the body. I tested two home remedies, Apple Cider Vinegar and Coriander Juice, and two medications, Lipitor and Crestor. I placed each of these substances in a flask with animal fat and let them sit for 24 hours. I weighed the fat samples before and after the experiment to record changes in mass. I found out that there is a significant difference in mass of fat when using the home remedies rather than using the medication. The home remedies were more effective in lowering cholesterol according to my data. With this information maybe people will try to lower their cholesterol levels the more effective and healthier way, rather than using medication, the less effective and more precarious way.

320-22 The effect of location on different types of bread

Sharon Ayzenshtat

(Roehrich – Products)

My hypothesis if you put the different types of bread in different locations then the bread in the storage will have the most mold because warm and humid locations cause mold to grow faster. The five different breads that I used are white, rye, challah, multigrain and bagel bread. I have to place five slices of the different types of bread and place them into 3 different locations. The locations I used for the bread are a storage unit, refrigerator, and a freezer. I checked on the bread at the locations everyday to see if any mold has grown. The storage had the most mold grow on the five different slices of bread. In conclusion my hypothesis was proven to be correct and all the five different bread slices that were in the storage grew the most mold.

316-05 Effect of acidity and temperature on a fruit's electric current

Bilal Azhar & Wendy Jiang

(Roehrich – Chemistry)

In this experiment we tested the effect of acidity and temperature on the electrical conductivity in fruits. Since fruits are known to be one of the best electrical conductors, they play an important role in this test. Effect of acidity was observed by comparing the voltage in each fruit (Lemon, Strawberry, Apple, and Tangerine) to its relative pH. Fruits with low pH indicates that it has high acidity, leading to a higher voltage. Effect of temperature was observed by placing the fruits at different temperatures (32 °C, 45 °C, and 52 °C) in a water bath, and then measured for their electric conductivity. As the temperature increased the voltage in the fruits also increased. Our conclusions based on the data, have proven to show that the voltage produced by fruits can be increased through certain conditions. The difference in voltage from pH passed the t-test, and is extremely significant. The same applies for the voltage difference between the temperatures. Without doubt acidity and temperature have significant effects on the electrical conductivity in fruits.

319-15 Does music affect memory?

Mohammad Bhuiyan

(Roehrich – Behavior)

In society, students do their homework while listening to music. A big part of homework is to remember vocabulary word and formulas. Before I conducted the experiment I asked 50 students if they listen to music while doing homework and 42/50 said yes. So I designed an experiment where students have to memorize 10 SAT words while listening to music for 2 minutes. I tested four different genres which were classical, pop, rap, rock with a control group as well. For the duration of the experiment i will test 10 student's ability to memorize SAT words and fill in the blanks.

318-04 Does coffee stain teeth the most?

Melisa Bicic

(Roehrich – Chemistry)

People like to drink coffee a lot, especially to energize them, but little do they know that, that beverage they love harms their teeth. I think that out of all the beverages I will test coffee will stain your teeth the most. To perform my experiment I got 3 eggs in the first trial and three in the second trial. For my beverages I used ginger tea, coffee and Pepsi. In my second trial I used chamomile tea, iced tea and coffee, I also used plastic containers, a toothbrush, toothpaste and a stopwatch. To perform my experiment for the first trial I took the three beverages ginger tea, coffee and Pepsi and I poured them in the containers completely covering the eggs. After doing so I put the eggs in room temperature and I allowed them to sit in the liquids. For about 4 days every day I took the eggs out of the containers and brushed them for about 2 minutes and with that I took pictures of the eggs every day to observe the stains on the eggs. For the next trial I did the same procedure except I used different beverages except for coffee. I determined my results by using a color scale indicator numbered 1-36, 1 being the lightest color and 36 being the darkest color using the pictures I took. My hypothesis was supported, coffee does stain your teeth the most.

319-05 Meat + Soda = ?

Victoria Boateng & Tania Sadiq

(Ross – Medicine)

Almost 80% of the time, people drink soda with any kind of meal with meat. The rest decide to drink water because it's much healthier than soda. As you drink, have you ever wondered what happens to the meat when it collides with soda or do you just believe that it digests and gets squished up? 'Is it healthy or not healthy for me to drink this with soda?' In this experiment, we investigated whether soda has an effect on raw meat. We believed that if chicken, beef, pork, and smoked turkey is placed in soda, then the soda will not dissolve in the meat. We took 4 samples of each chicken, beef, pork, and smoked turkey and put 1 of each in a plastic tray. After, we filled them up with soda/water and waited 5 days to see the outcome of soda and meat and water and meat. As a result, our hypothesis was not supported. Instead, the opposite happened, the soda preserved the meat. We thought the meat was going to smell bad and get rotten, but it did not. All kinds of meats had effects on their skin and each of them seemed to have gotten darker, except in water. The meat may have dissolved the soda, but the soda won't dissolve the meat. This experiment simply illustrates that it's safe to drink soda with meat because the pH level of the stomach is higher than pH level in the mouth, where soda can erode teeth.

316-04 What disinfectant kills the most bacteria?

Hareem Bokhari

(Ross – Products)

Which disinfectant kills the most bacteria? The purpose of this experiment is to investigate which cleaning supply kills the most bacteria on a doorknob over a period

of time, allowing us to know which disinfectant is the best to use at home. This experiment could be globally important and relevant to the society because with fewer bacteria we can avoid sicknesses. For this experiment I chose 5 doorknobs throughout the school, including the boy's and the girl's bathroom doorknob. The four cleaning liquids I used were Clorox, Fantastik, Seventh Generation, and Lysol. These are the most widely known disinfectants in America. First, I swabbed the doorknobs to see the amount of bacteria already on it. Then, I divided the doorknob into 5 parts. On each part I used different cleaners and the control, distilled water. After 2 minutes, I swabbed again. I repeated this procedure for each doorknob (5) and each trial (10). Lastly, I calculated the percentage of bacteria grown after the Petri dishes had been incubated at 25 °C for 2 nights. The results were that the Anova testing indicated that the P value is greater than .5 and therefore not significant. There is no significant difference in between the disinfecting factors of the cleaners. They all kill approximately the same amount of bacteria.

320-09 Which food wrap preserves fruit the best?

Nadine Brewster

(Roehrich – Products)

My experiment was done to test which food wrap will keep apples and pears the freshest. I used wax wrap, plastic wrap, and foil. One of each fruit was wrapped in a different type of wrap. For two weeks, the fruits were kept in a fridge and each day I would observe them and take the percentages of how much each one has browned. As a result, I observed that wax wrapped worked the best for both fruits.

320-13 Geometrical object's structural load capacities

Leutrim Cahani

(Sullivan – Engineering)

The building in which you are reading this and which i am typing this in, both have structures to hold them up. But how are these structures so stable and so sturdy? This is the question which has persuaded me into conducting a structural analysis on the structure load capacity of different geometrical objects. I hypothesized that triangles will have the greatest structure load capacity when compared to squares and arches. In order to prove this, i constructed 12 triangles, 12 squares, and 6 arches. I connected them into a structure resembling shape and placed loads on top of them until they collapsed. The results showed the triangles having an average structure load capacity of 3166.00 grams, the squares having an average of 3100.00 grams, and the arches having 933.33 grams. These results proved my hypothesis correct. This also lead me to conclude that triangle inclusive structures have a more rational application due to their efficiency for the least amount of materials, 16 toothpicks compared to the squares 20 and the arch's 16. This experiment also proves that stability is a critical factor in a structures load capacity. This experiment gives justification to the usage of triangles in building structures and an insight into the world of civil engineering.

318-22 Saving light

Xiao Jun (Gloria) Cao & Nga Ying Lo

(Ross – Physics)

Light is known as an energy that could be used to power electronics when it is absorbed by solar cells. However, solar cells would stop working as soon as light stops shinning on it thus, a supercapacitor can be used, a machine that stores energy. The purpose of this experiment is to investigate how long a car's electric motor will last by using a supercapacitor that is charged based on certain duration. This experiment could be globally relevant to society because solar panels provided free electricity from the sun if installed to cars and house. It may also replace many resources that are being used in daily life to prevent the level of pollution from increasing. The hypothesis investigated in this experiment is that as time of charging the supercapacitor increases, the car's electric motor will be able to last longer. To perform the experiment, the supercapacitor

will be placed in direct sunlight. A timer would be used to time however long it takes for the motor to stop spinning with a cardboard covering it. The supercapacitor is tested for a total of 100 trials with an increment of 5 seconds after every 10 trials. ANOVA test and t-test were performed to determine the significance of the experiment and it is concluded that the results of are significant supporting our hypothesis. Some outliers were 20.21, 21.31, 42.1, 29.6, 42.1, 72.61, 78.96, 131.8, 128.98, 127.98, and 149.76.

314-01 Which substance melts ice the fastest?

Hou In Chan

(Ross – Chemistry)

In this study, the types of substances that would melt ice at the quickest rate were investigated. The initial idea was to determine if rock salt was the best choice to melt snow or not. Partial charges of water molecules allow ions that form salt to easily split into smaller ions for dissolving. Salt replaces the molecules captured by ice and breaks them up to form liquids. The hypothesis was that if table salt was tested, then it would melt ice the fastest because it lowers the melting temperature and has less surface area, allowing faster breakdown of particles. This experiment was conducted by measuring the volume of melted water after sprinkling different substances on ice cubes for 10 minutes. Table salt recorded an average of 6.33 mL of melted water. Rock salt, sugar, baking soda, and black pepper had an average of 3.52, 2, 0.98, and 0.04 mL of melted water respectively. The control group only had 0.17 mL in comparison. Table salt had the greatest volume, meaning it melted ice the most effectively. T-Test revealed that all the other substances except pepper have a 99% confidence level; Pepper had no impact on melting rate. Rock salt, typically used to defrost ice, did not work as effectively as regular table salt. This shows that table salt is a better substance to use on ice after a snow storm. In conclusion, the hypothesis was supported because table salt melted ice the fastest.

314-13 Effectiveness of Acne Medication / Face Washes That Prevents Bacteria

Kimberly Chan & Leann Whyte

(Roehrich – Medicine)

This science fair project aims to validate the effectiveness of acne medications in preventing the growth of bacteria. This experiment will be carried out using 4 types of acne medications, Clinique, Sewame PXE, Vejeze, and Clear Skin. Four types of acne face washes, Biore, Neutrogena, Purity, and Cavilion. We predict these acne medications will effectively inhibit the growth of bacteria that causes acne. Our reasoning for conducting this project is because many people in their everyday lives including people in our age group tend to deal with acne every day. It is a common issue with everyone and we are trying to find out which acne medications and face washes can effectively work. We are going to test all these products by using them with the bacteria called *Micrococcus letus*. It is close to the kind of bacteria that we find on our skin. Out of the 8 products that we tested 2 worked the best and 2 products were average. Based on our experiment we concluded that various acne medications work and not all name brands work the best. So it is important to see what works best for you and just because it's expensive does not mean it will help cure your acne.

318-10 The effect of music on memory

Hannah Chen

(Roehrich – Behavior)

Many people believe that one should study in a quiet environment but can music be beneficial during studying? Many people believe that music is distracting while studies have shown that music stimulates the brain. Studies have also shown that classical music is the most beneficial for the brain during studying because it activates both the left and right side of the brain. This makes it easier to concentrate and retain information. The purpose of this experiment is to test that theory and to look at the effect of music on memory, if there is any. Ten participants were picked to be tested.

They were instructed to study 15 vocabulary words while listening to a specific genre of music. They were tested 5 different times with 4 different genres of music and once with no music, which acted as the control. The genres include pop, rock, classical, and country. Each time, they were given a different vocabulary list but of the same comprehensive level. Their grades were calculated out of 15 and averaged up. The results show that music does not have a significant effect on memory/concentration. The average of the grades of the control was 9.5 which was higher than all the other averages of the experimental factors. These results also show that the theory that classical music is the most beneficial proves to be wrong. So the myth that one should study in a quiet environment proves to be true.

320-06 The effect of lotion on fingerprinting

Sammy Chen Li

(Ross – Products)

The main objective of this experiment is to determine if lotion affects how fingerprints appear during fingerprinting. Fingerprints are essential to determining each individual's identity. As a result, during fingerprinting, the clarity of the fingerprints should be clear and sharp. The hypothesis for this experiment was that lotion treatment will enhance the clarity of fingerprints rather than no lotion treatment. Twenty subjects participated in this experiment. Each subject in the experiment was to use their right hand, index finger to fingerprint. The control group received no lotion treatment while the experimental group received lotion treatment for five days. For each of the five days, the subjects in the experimental group used a different brand of lotion for five consecutive days. The lotion types were restricted to hand cream and/or moisturizer. Each participant in the experimental group used the amount of lotion they preferred. The fingerprints were then graded on a scale of 1-5, where 1 represents 'not clearly visible, 3 represents clearly visible, and 5 represents smudged. For analysis, statistical t-testing showed no significant difference between 4 out of the 5 lotion brands compared to the control group. As a result, lotion doesn't have an impact on fingerprinting clarity. As with all experiments, there are sources of errors. For instance, room temperature may have affected the moisture of the human skin since the experiment was conducted in a few different locations. In conclusion, fingerprints with lotion can show just about the same fingerprint without lotion.

319-22 Which antacid works the best?

Mohammed Chowdhury

(Roehrich – Chemistry)

The purpose of this experiment is to see which brand of antacids cure our stomachaches the best, in other words, relieving our stomach acidity by raising the pH of our acidic stomach to a normal resting pH of 3-4. This way, we can choose the best antacid brands without wasting our time. The procedure for this experiment starts with our different antacid brands, 1 M HCl acid and distilled water. The brand that is being tested is dissolved in 50mL of water and then left to react with 20mL of HCl acid. The pH is tested after the reaction is complete. Several trials are run for each brand and a specific number of tablets (1, 2 or 3 because sometimes we tend to take more dosages based on how we feel even though sometimes we shouldn't.). Based on the results, it is found that Pepcid Complete is the best antacid brand that steadily increases pH as the number of tablets you take. The amount of acid we used is 20mL, however the amount of extra HCl acid extorted in our bodies depends on the person who has over-ate in size and weight. So we can conclude that Pepcid Complete is the best antacid brand that accommodates the average American to the more obese Americans. This study will help them and possibly even you to choose the right antacid during your next visit to the pharmacy.

314-04 Death of a Serratia

Angella Christopher

(Roehrich – Microbiology)

The purpose of this experiment was to test which cleaning products killed the most bacteria called *Serratia marcescens*. This bacteria can be found in bathroom, soil and even places that are considered sterile. I chose this experiment because I was interested in knowing which products killed bacteria the best, chemical, Eco-friendly, or natural products. Since this bacteria lives on many surfaces, exposed to ourselves and family, I wanted to find the best way to keep many people safe from this infectious bacteria. The chemical products used were Clorox and Ammonia. The Eco-friendly products were Simple Green and Mrs.Meyers surface cleaner. The natural products were Citrus Vinegar and Baking Soda and water cleaner. This experiment is relevant to everyday society because we will know which products kills more bacteria. Knowing this information benefits our planet and our wallets. We will be able to save money by buying only the effective products as oppose to buying several ineffective products. This decreases the amount of other products used, decreasing the amount of harmful chemicals released into our atmosphere. All my trials were incubated upside down in 25 degree Celsius. Before experimenting, I hypothesized that Clorox would be the most effective product being investigated. To carry out my investigation I used sterile techniques to conduct a bacterial sensitivity test. With a 95% confidence level, on average Clorox killed the most bacteria, because it's zone of inhibition was the largest.

320-18 The effect of different toothpaste brands on *Micrococcus luteus*

Roshan Chudhry & Nadia Brijmohan

(Sullivan – Products)

Our project was based on the effects of different toothpaste brands on *micrococcus luteus*, which is a bacteria found in the mouth. Our problem was which brand would be most effective against *micrococcus luteus*? Finding the most effective brand against this bacteria could lead to useful information regarding what ingredients should be greatly used in toothpaste. We discovered through research that fluoride is an important substance found in toothpaste that helps prevent tooth decay and protects against bacteria. Therefore we hypothesized that Colgate would be the most effective since it contains the most fluoride. Through our results, we discovered that Crest which contains less fluoride than Colgate was actually the most effective. This could be due to the baking soda and peroxide that it contains. This was surprising due to the fact that fluoride is claimed to be one of the most important ingredients found in toothpaste and it did not work as well as we hypothesized it would have. Therefore our hypothesis was refuted. Baking soda and peroxide proved to be more effective than fluoride, and because of this we think it should be used in greater quantities than fluoride. There was an outlier in the data: Pronamel. It had an average zone of inhibition of 12.8 while all the other brands had averages above 20.0. Discrepancies included that we did not wait for materials to cool before using and some dishes were unprepared which led to results we could not use.

316-20 DNA of fruits vs. DNA of vegetables

Matthew Chung

(Ross – Cellular)

The science project that was conducted was based on DNA comparison between fruits and vegetables. DNA is essentially the main building block in all living organisms and determines what genes the offspring will inherit. DNA is made up of 4 different bases named adenine, thymine, cytosine, guanine and thymine that are paired up respectively. I wanted to find out whether fruits contain more DNA. or do vegetables contain more when extracted. The hypothesis stated was that fruits will produce a greater amount of DNA rather than vegetables due to the main role of fruits in the environment. The results showed that there was a statistical difference in data. In order to conduct this experiment you must first obtain the fruits and vegetables, obtain the

cell soup and filter it. Then you must transfer the DNA. into a culture tube, centrifuge it, weigh it and record the final mass.

319-14 Testing glucose levels in different apple juices

Talyah Cruz

(Roehrich – Chemistry)

According to the USDA, one cup of unsweetened apple juice contains 24 g of sugar. However, there are many different store brands of apple juice and as consumers we do not know if what we are consuming has additives. I set out to test how store brands compared to homemade apple juice. Using glucose test strips, I measured the levels of glucose in 10 different brands of apple juice. Then I made my own homemade apple juice and tested that as well. The results indicate that all brands of apple juice tested have the same levels of glucose as homemade. Most of the data was uniform throughout suggesting that there is no significant difference.

318-08 Think fast! Think hard!

Quetourah Dalencourt & Brianna Guillaume

(Roehrich – Behavior)

This project's purpose is to discover how cell phone conversations affect reaction time, and how texting affects concentration. In the experiment, a fixed number of test subjects' reaction time was tested as the control, first. Then, the experimental was tested while they were speaking on the phone. To test concentration, a control test was first given to the test subjects. Then, for the experimental, another one was given while they texted. There was a written test and an oral test. After the results, there was not a high confidence level for the reaction time test. Cell phone conversations did not have any dramatic effect on reaction time. The test subjects seemed to have the same reaction time for both the control and the experimental tests, or they had similar reaction times. For the concentration testing, there was a significant difference in concentration. Texting did have an effect on how long it took the test subjects to finish their work. Reaction time testing relates to the real world. In the real world, people speak on the phone while driving often. Driving while speaking on the phone has been the cause of many tragic deaths. Although not nearly dangerous as texting and driving, it is still very dangerous. Similarly, concentration while texting also relates to real world situations. A high percentage of children, teenagers, text while doing school work regularly. Students text and do homework regularly, habitually. Students even text while in classrooms when the teacher's attention. These factors impact individuals, and society.

319-24 Whitening ability of different types of toothpaste

Hussein Fardous

(Roehrich – Products)

The purpose of this experiment was to determine which toothpaste being tested is the most effective at whitening stained teeth, stained by everyday common drinks such as coffee and tea. This is the problem being solved and investigated. People are victims of tooth discoloring and tooth decay caused by drinks, plaque, etc. This experiment helps people choose the best whitening toothpaste that can get them good results because major toothpaste brands always argue that their products are the best and people don't know which to buy. Therefore, this experiment solves their problems. This way, it's a lot faster and cheaper for people to find the right toothpaste for them. My approach for investigating the problem was to basically soak eggs in 500 mL of Pepsi, tea, and coffee for 24 hours and then record the color shade of the stained eggs using a dentist guide. Then, I applied 2 cm of each toothpaste on an egg stained with coffee, tea, and peps. I then recorded the overall color change caused by each toothpaste. The higher the color change, the better. Based on my results and T-Test values, Crest was better at whitening stained teeth with above a 95% level confidence than Colgate and with above a 98% level of confidence better than Aim and AquaFresh. In conclusion, the results from the

experiment supported my hypothesis because Crest ended up producing more overall shade changes than the other toothpastes. The contribution of this experiment is to save people time and money.

316-08 Mouthwash product testing

Zachary Feinstein

(Sullivan – Products)

This experiment is testing the effectiveness of various brands of mouthwash: Listerine (contains alcohol), Crest Pro (doesn't contain alcohol) and Tom's All natural (made of natural products). Using *Micrococcus luteus* as a substitute for *Streptococcus salivarius*, I was able to test the mouthwash's effectiveness by measuring the zone of inhibition caused from placing a small sample of each mouthwash on a piece of filter paper. After several trials, I found that Crest Pro was the most effective, whereas Listerine, a popular mouthwash, was only slightly effective at killing bacteria, even though it contained alcohol. This disproved my hypothesis that, as a popular mouthwash, Listerine would be the most effective. However, further trials may be necessary, as some trials produced more varying results than others.

318-06 Exposure of baby food and the degree of contamination

Eman Gad

(Roehrich – Medicine)

The purpose of this experiment is to compare the degree of contamination in baby food based on three different storing methods. Food storing methods are very important to our health and especially to the health of people with weak immune systems such as babies, which is why I chose to study contamination in baby food. Contamination in food can lead to food poisoning and other illnesses. This information would be especially important to caretakers and parents of young children. I hypothesized the longer baby food is left out in room temperature the more contaminated it will become, compared to refrigerated baby food. To approach my experiment I labeled each baby food bottle A, B, or C. Bottles labeled A are opened briefly, then closed and refrigerated immediately for 24 hours. Bottles labeled B are opened and left out for 30 minutes, then closed and refrigerated for 24 hours. Bottles labeled C are opened and left out for 30 minutes. Then closed and left out in room temperature for 24 hours. After the 24 hour incubation period I took a swab sample from each bottle and swabbed it on the agar plate. Then, the plates were incubated for three days in room temperature. Afterwards, the results were collected in terms of zones of inhibition. The T-value between A&B and A&C exceeded 99% confidence, this proves that there's a significant difference in bacterial growth. From the results, I can confirm that my hypothesis was supported. Refrigerating food as quickly as possible ensures the least amount of contamination and keeps food as sanitary as possible.

316-17 What drinks contain the most electrolytes?

Alexandra Gayle & Kai Saunders

(Sullivan – Chemistry)

Our experiment tested which drinks had the most electrolytes. Electrolytes are ions that are able to conduct electricity. They help regulate bodily fluids and when exercising people lose electrolytes through sweat. The drinks that were tested were bottled water, fountain water, Gatorade, PowerAde and three drinks that were homemade. The homemade drinks were lemon soda, green smoothie and orange lemonade. It was hypothesized that the lemon soda would contain the most electrolytes because it contained baking soda. To test the amount of electrolytes that were in each drink, a conductance circuit had to be built. After the conductance circuit was built, the conductance sensor was placed into fifty milliliters of each substance. The results proved the hypothesis correct; the lemon soda contained the most electrolytes.

318-15 Exposure of baby food and the degree of contamination

Lauren George

(Sullivan – Chemistry)

On containers of baby food it states refrigerate after opening, is that true or is it just a scam so people can buy more baby food? This project looks at the degree of bacterial contamination over 12 and 24 hours. Three types of baby foods were tested, chicken, carrot and banana, each were left out for 12 and 24 hours. My hypothesis was that if you leave baby food out for 24 hours, then it will have the greatest amount of bacterial contamination. The experimental results supported my hypothesis, by showing that baby food when left out for 24 hours had the greatest amount of bacterial contamination. This experiment further proves that chicken has the highest rate of bacterial contamination, as opposed to carrot and banana.

320-21 Daphnia at different pH level environments

Samantha Gordillo

(Ross – Chemistry)

Many organism can't live in all types of environments. The main point focus of this experiment was to test if this specific species could survive in different pH, the measure of the acidity or basicity of an aqueous solution, level environments. According to this specific research topic there hasn't been many been many research on this topic. The basic background on Daphnia's, small aquatic crustacean commonly known as water fleas, is that they survive in acidic swamp to freshwater aquatic environments. Now whether the statement that they do is true well that's point of this experiment. When it comes to final results my expectation is that the statement is true. The basic procedure of this science experiment was to place a certain number of daphnia's in each different type of pH solution for a specific period of time. Unlike the information stated based on daphnia the experiment wasn't successful. The interpretation of the results mean either I the experiment was not conducted right or that the fact that they can survive in acidic aquatic environments is wrong.

320-11 Cell phone radiation

Daniel Guobadia

(Sullivan – Products)

My science fair project is based on cell phone radiation. Cell phones work by transmitting and receiving radio waves at microwave frequencies. I will be testing to see which type of phone emits the most radiation. Cell phone radiation is potentially harmful if it is received in large enough amounts. If iPhones emit more radiation than androids, then they are more harmful to your health because your body absorbs the radiation each time you use it. I conducted this experiment by using the cellphone being tested to call another one. I then placed it a ring stand and placed the microwave leakage detector in the other ring stand. Finally, I recorded the numbers displayed on the screen and averaged them.

320-10 Is multitasking actually possible?

Khadija Hasne

(Roehrich – Behavior)

My project is to test if multitasking actually possible The purpose of this project is to discover and test if multitasking can be attained. Humans can't multitask very well and when people say they can they're deceiving themselves. Our brains are programmed to focus on one task and one task only. Trying to focus on two things at the same time is physically impossible but what is possible is to shift our focus from one thing to the next at astonishing speed. Switching from task to task allows you to think your actually paying attention to everything around the same time but in reality you're not. During this experiment four different TV shows were played. Each TV show was played during its own trial. The TV shows being used during this experiment were Sponge Bob, a

Nature Documentary, Keeping up with the Kardashians and Ellen. Weather or not a TV show was being played the time given remained constant which was 30 sec. for math and 1 min.30 sec for reading. The math trials consisted of 10 open ended simple addition, subtraction, multiplication and division problems that needed to be solved within the time span of 30 seconds. The reading trials consisted of 10 multiple choice questions based on a brief paragraph that needed to be read in order to solve the 10 multiple choice questions which needed to be completed in one minute and 30 seconds. Two trials in this experiment were the controls (one for math and one for reading) meaning the 10 problems that needed to be solved were done so without a TV show being played. The experimental trials were completed while a TV show was being played and a different TV show was used for each trial. Weather or not it was a control or experiment trial the time given to complete the problems remained constant (30 sec. for math and 1 min. 30 sec for reading) In conclusion the data received from this experiment proved that in fact multitasking is not possible.

319-10 The effect of antacids on the stomach

Noshin Hayat

(Roehrich – Medicine)

Stomach acidity is a common problem and often turns into painful problems, such as heartburn. A popular solution to this problem is to consume antacids. Antacids work by increasing the pH level in our body and neutralizing the acidity. For this experiment, lemon juice was used as the acid. Different brand name antacids were tested for their change in the pH value and then compared to a generic brand of antacid. I predicted that if the brand name antacids increased the pH level more than the generic brand, then the brand name antacids would be better. This experiment was done by crushing each tablet of antacid and dissolving it in lemon juice, then the pH value of each was measured using the pH meter. According to the pH meter, the best antacid was found to be Alka-Seltzer. Most importantly, my hypothesis was refuted because the generic brand of antacids (Rite Aid brand), proved to be more effective than two name brand antacids, Pepto-Bismol and Roloids. So, this helps our society because often we think that name brand medicines are the best, but this is wrong because two of the brand name antacids turned out to be worse than the generic brand of antacids which was store bought. Next time, we should keep in mind that store bought medicines are very effective if not better than brand name antacids.

314-10 Brine shrimp hatchery

Xiomara Heron

(Ross – Animals)

This project is about brine shrimp and which salt is the most effective for hatching them. To start the project, I placed 100 ml of water into 32 plastic cups. In the project I used table salt, rock salt, aquarium salt and just plain water. I placed about the same amount of brine shrimp eggs using a . After the brine shrimp were in the cups I placed an air pump in them for 2 minutes each. I used the air pump since the shrimp only hatch in aerated water. After I aerated the water I place each cup under light for 24 hours. The next day i counted how many shrimp hatched in each type of salt. Since the brine shrimp are small when they first hatched, I transfer the brine shrimp from the plastic up to a bigger beaker. Then I used a micro pipette to transfer the brine shrimp I saw moving into a other beaker. I had to transfer them again since the shells from the hatched shrimps, and the unhatched shrimp made it difficult to hatch. For Rock salt had an average of 63 brine shrimp, the table salt had an average of 21 brine shrimp hatched, and the aquarium salt had an average of 42 brine shrimp hatched. The water was used as my control and didn't have any brine shrimp hatched. Possible sources of error in my project were that the beakers with the table salt were blurry so I'm not 100% sure that I got every shrimp. Also the shrimp take 24-36 hours to hatch and they don't survive long without food so some could have not hatched or died. My conclusion was that the most effective salt to use was rock salt.

319-20

Tyler Hines

(Ross – Animals)

319-01 Chewing gum's effect on concentration

Kimberly Ho & Vladislav Davidov

(Sullivan – Behavior)

For thousands of years, chewing gums has been beneficial to countless societies throughout Mesoamerica and abroad. Originating from the sap of the Sapodilla tree, this elastic tree sap has turned into a child-friendly treat of the 21st century. The purpose of our experiment is to see if chewing gum has an affect on concentration after the performance of jumping jacks. We went about this by having test subjects do jumping jacks for 20 seconds, followed by an intermediate level crossword puzzle; we would repeat this again with the use of chewing gum after jumping jacks. We hypothesized that chewing gum would increase concentration, this hypothesis was due to our research which reflected that chewing gum has been know to help with ADD and ADHD. Based on our results we came to the conclusion that chewing gum does not improve concentration, therefore refuting our hypothesis.

320-08 How does type of material affect the amount of static electricity?

Tiffany Hong

(Roehrich – Physics)

The purpose of this experiment is to investigate the amount of static electricity in various materials. It is to determine whether human hair, polyester, carpet, cotton, nylon, or a ceramic tile has the most static electricity. Static charges are easily created by rubbing two insulating materials together. Friction between the two materials helps to generate static electricity. For this project, sheets of paper were cut up into 200 pieces measuring 5mm by 5mm. A balloon was blown and was rubbed against a material 5 times. Then, the balloon was placed above the paper bits to see how much paper it can pick up. This was done for 6 different tested materials. By testing different objects with a balloon for how much paper it can pick up, it was proven that human hair is the most static.

320-03 Does pH affect water quality

Atifa Hoque

(Ross – Environment)

In this experiment, the pH and water quality of six types/bodies of water was recorded and compared. The pH of a liquid solution is its amount of hydrogen ions or hydroxide ions. To find the pH of the waters, a pH meter was used. Water quality is the appearance, smell, and sometimes taste, of the water. Measuring the dissolved oxygen of the water is a way to determine its water quality. A probe was used to find the dissolved oxygen. Each type of water was tested a total of 12 times: six for pH and six for water quality. The hypothesis for this experiment was that the pH would affect the water quality. Testing occurred only during midday to early evening hours. The results indicated that the quality of the water did not vary despite the pH varying above or below neutrality (pH of seven). This concludes that pH and water quality do not correlate at all.

314-08 How does music affect the growth of plants?

Zarin Hossain

(Roehrich – Plants)

How does music effect the growth of plants? Plants generally grow only being exposed to sunlight and water. My hypothesis is that both experimental will grow first and taller. Music has sound waves which shakens up the seeds which allows plants to grow faster or can slower down the growth. In this experiment, country music was played for three

hours daily to my experimental group. My control group only received sunlight and was watered. Both plants were watered every other day, received sunlight, and was measured. There was two trials done and was tested for two weeks. My hypothesis was refuted because in both trials, my control grew first but in both trials my experimental grew taller.

319-17 Comparison of wet and dry food - Cucumbers vs. Crackers

Jinyan Huang

(Roehrich – Microbiology)

Germs exist everywhere and they can easily enter our body when come in contact with any surfaces. Bacteria are one of the major types of germs that get nutrients from the environment and reproduce. If the foods that you consumed got contaminated, it can cause illnesses. The topic of the experiment is to compare the germ contamination of wet and dry foods and investigate which location causes the food to grow more bacteria. Cucumbers were used as wet food and crackers as dry. The control group is the cucumbers and crackers. The constant variables are the distilled water, the temperature of the room and the ingredients used to make the agar. This experiment is carried out by dropping the foods on the floor and sink for 30 seconds. Dip a disinfected swab into the distilled water and rub it over the surface of the food. Next, swab over one section of the Petri dish for bacterial growth. My hypothesis was supported that cucumbers are more prone to germ contamination. The cucumber itself had an average of 240 colonies while the crackers had an average of 2.1. Also, a T-test was performed. With a 90% level of confidence, there is significant difference between cucumber/dry floor and cracker/dry sink, both with a t-value greater than the critical value, 1.75 with a degree of freedom of 16. This experiment informs people that bacteria can multiply rapidly. It is important to maintain our personal hygiene and the sanitation of the environment.

320-01 Active live cultures in yogurt

Emily Hui & Abigail Iaquinta

(Sullivan – Microbiology)

Many times people buy yogurt and look at the labels on the container to find 'active live cultures' written as a part of the ingredients. Though the name sounds scary, it is just a term to say that it contains bacteria. That doesn't sound very appetizing but the bacteria can actually help preserve the yogurt and keep you healthy but how do you know that the yogurt contain bacteria in them? The purpose of this experiment was to see which yogurt contains the highest percentage of active live cultures in them. If the yogurt had fruit and is more expensive then there would be more bacteria growth. Split the agar plate into four quadrants, spread the yogurt thinly over (leaving one fourth as the control) and incubated it. In the end, the average costs for the yogurts ranged from \$0.60 up to \$1.99. The bacteria growth in the yogurts came out to be between 0% and 100%. Clearly this shows you that even though many of these companies claim that their yogurt contains active live cultures, they're not telling the truth.

314-06 The effect of different genres of music on memory

Farha Hussain

(Roehrich – Behavior)

The purpose of this experiment is to figure out if music has an effect on how students perform on tests after 'studying', or in this case, reading a passage. In this experiment, the control group consists of ten test subjects who must read a short passage in the span of five minutes. Then they will answer five comprehension questions pertaining to the passage. In the control group, the students do not listen to music while reading. There are four experimental groups and in each group, the same ten students listen to a different genre of music while reading. Research has shown that music can give people pleasure which allows the brain to release a neurotransmitter called dopamine. Positive emotions indirectly have an effect on making memories. My hypothesis is not fully

supported because the average number of questions answered correctly was more for the control group, where the students did not listen to music. Only one genre of music showed that the students answered more questions correctly. This genre was rock. It can be stated with less than 90% level of confidence that hip hop, rock, and classical music do not have an effect on a student's ability to study and memorize. It can be stated with a 95% level of confidence that the musical genre of pop does have an effect on studying and memorizing.

316-19 The effects of temperature on crystal growth

Leah Hutchinson

(Roehrich – Chemistry)

Temperature is a common factor to most objects. It is also a factor to the growth of crystals. In this project, the growth of crystals were observed. A borax solution was placed in two different locations. During a period of time the jars in each of these locations were observed and the growth of the crystals were recorded. Overall like expected there was a difference in the results of the jars in each location.

319-13 Which brand of disinfecting wipes is most effective?

Nikola Iberle

(Sullivan – Products)

The purpose of the experiment was to figure out which brand of disinfecting wipes was most effective. Disinfectants kill bacteria rapidly by altering their cell walls so that the bacteria stops growing. Three brands of disinfecting wipes were tested: Clorox, Lysol, and Rite Aid brand. My hypothesis is that the Rite Aid brand will be the most effective. The three brands were tested by collecting bacteria sample with a cotton swab from bathroom door handles, later disinfected, and collected bacteria sample again, and compared the two. In order to compare the before and after effect, the control side of the agar plate was made by dipping a cotton swab in distilled water and later spread over the plate. The data collected showed that the Rite Aid brand was most effective. The main issue with this experiment was that the control side was often contaminated. To improve this project, the distilled water should not be shared, and kept safe from contamination.

316-14 Which type of milk has the most protein?

Sana Ilyas

(Sullivan – Products)

In this experiment, I tested which kind of milk will yield the most protein. For this experiment, I tested almond milk, rice milk, soy milk, 2% milk, whole milk and organic whole milk. I believed that the organic whole milk would yield the most amount of protein. To extract the protein, I first heated the milk to 40 °C. Then, I added vinegar, and swirled the mixture for 10-15 seconds. After, I poured the mixture into a flask with a funnel and coffee filter paper. I let it sit overnight, and then the next morning the coffee filter paper was weighted. After tested all six milks, I found that the 2% milk ended up yielding the most amount of protein, the rice milk and almond milk yielded little to no protein, and the organic whole milk, whole milk and 2% milk were close in the amount of protein they had.

320-07 Which cleaner is most effective?

Rumsha Javed

(Ross – Products)

Many cleaners state that they kill 99.9% of bacteria and that they are very effective against bacteria. Cleaners, such as Fantastik, Lysol, Clorox, Mr. Clean, and Simple Green, were tested on bacteria to see which one was the most effective. The hypothesis for this experiment was 'If different cleaners were used on E. coli(the bacteria used), then Mr. Clean would work better because it has better reviews.' To test this hypothesis,

E. coli was spread across the surface of an agar plate. Then a sterile, plain disc was dipped into each cleaner and placed onto the plate. Each plate was incubated overnight at 37°C. During this procedure, all the equipment was sterilized to prevent contamination. The plates were divided into 4's: one side was the control and the other 3 sides were cleaners. Each quadrant had a width of 50 mm. After each plate was incubated, the zones of inhibition ranged from 6mm-45mm. In order to see if there was a significant difference in the data, ANOVA and t-tests were used. After the statistical testing, it could be concluded that there is no significant difference in the data. This means that it does not matter which type of cleaner one uses, the effects will be the same. The hypothesis was not supported. There was a significant difference between the zone of inhibition for the control and the zone of inhibition for the cleaners. This proves that the cleaners do disinfect.

319-02 Zit off!!! The cure to acne problems

Keisha Jean-Charles

(Ross – Products)

This experiment is about product testing of acne medications on bacteria (micrococcus). Acne occurs when clogged pores are formed by oil glands that enter tiny openings of hair follicles. Many acne medications contain either one of these ingredients which are benzoyl peroxide and salicylic acid. The materials involved in this experiment included five different brands of acne medications and micrococcus. In order to find out which one was the best, for one trial, I would put the same amount of bacteria in two nutrient agar plates which were separated into thirds or fourths. Then, I would take a plain disc using the forceps and dip it into each medication; each disc placed into its designated section with a regular plain disc as the control in each plate. The results have shown that the Neutrogena benzoyl peroxide acne medication is the best. This is because it had the greatest average in the measurement of the bacteria killed area. The sources of error involve the contamination of the bacteria. It occurred possibly by touching it. In order to improve on it, one should wear gloves when working with bacteria. All in all, this experiment demonstrated that certain acne medications are better at killing bacteria than others.

314-07 The effect of age on lung capacity

Adela Julevic

(Roehrich – Behavior)

Vital capacity is the maximum amount of air a person can expel from their lungs. When a person ages, their vital capacity changes. The purpose of this experiment was to determine how age affects lung capacity. It determined lung capacity by having ten people in each age group blow through a pedometer. It was hypothesized that the oldest age group, ages 30-49, would have the most lung capacity compared to the other age groups. The hypothesis was supported. In conclusion, age has an effect on lung capacity.

316-06 How does gum affect a students test result?

Moomitu Kashem

(Ross – Behavior)

In this experiment, thirty people are tested to see whether chewing gum during a test improves test results. If a person chews gum while taking a test, the students test grade will improve. In the beginning 30 students are going to take a twenty-five question test in seven minutes. After that, for 4 minutes they will take a break and then start chewing a spearmint flavor strident gum. After 2 minutes of chewing the gum, the students will take the same test in seven minutes again. After the students take two of the test they are then allowed to see which question they got right or wrong. During this experiment out of the thirty students, twenty-seven of the students saw an improvement in their test results. The other three students test result did not improve on their second test. This experiment has supported the hypothesis that chewing gum will improve a

student test result since there was a majority of people who saw an improvement in their test results. This shows that if students chew gum while taking an important test their test will improve because they concentrate and think more clearly while taking the test. States that have lower test result should give children a piece of gum so they can relax and think more clearly while taking a test

320-04 The effect of different soap on E. coli.

Fhamida Keya

(Ross – Microbiology)

The pathogenic bacterium is a threat to the health of human beings. It is capable of causing diseases and infection to the host and spreads among the human population through the environment since bacteria can be found virtually anywhere. People have been trying to find ways to not get in contact with the bacteria and one of the numerous ways is the use of soap since it helps to suspend bacteria out of the surface by its high pH level. The purpose of this experiment was to determine which branded soaps is the best at limiting the growth of E. coli strains. The experiment required nutrient agar plates covered with E. coli strains. The discs, dipped into the products, were put in the agar plate which then was incubated. The zones of inhibition was measured the next day and was recorded. Among the four brand soaps such as Dove, Lever2000, Irish spring and Ivory, the most effective was Dove with an average of 20.27 mm of zones of inhibition based on the 50 trials all together. The second most effective was Irish Spring, followed by Lever2000 and Ivory being the least. The hypothesis was that Ivory will be the most effective because of its minimal use of chemicals but the result did not support the hypothesis. The result of this experiment can be useful to everyone. People will know which product works the best and therefore will be inclined to buy that product and save money while being healthier.

319-07 Comparing antacid potency

Aisha Khoja

(Ross – Products)

Those who experience heartburn or indigestion after a big meal often relieve this pain by taking an antacid. An antacid is a type of medication that lowers the level of acidity in the stomach when it is too high. The purpose of this experiment was to compare the efficiency of different brands of antacids. This can be beneficial because it will inform people which antacid will be the most effective in relieving their pain. I tested the effectiveness of five different brands by neutralizing solutions of antacids dissolved in water using 0.5 M hydrochloric acid. The antacid that required the most acid to reach neutralization was the most effective. My hypothesis was that Phillips' Milk of Magnesia antacids would be most efficient. The results showed that the Rite Aid brand neutralized an average of 1.71 mL of acid, Phillips' neutralized an average of 10.62 mL, Gaviscon neutralized an average of 1.27 mL, Rolaids neutralized an average of 2.76 mL, and Tums neutralized an average of 4.6 mL. Statistical tests such as ANOVA and t-testing showed that there was a significant difference between these averages. Therefore, my hypothesis was supported and Milk of Magnesia was the most efficient.

314-09 The effect of pH on the oxidation of fruits and vegetables

Polina Khomyachkina & Rachel Bai

(Roehrich – Environment)

The purpose of the experiment was to determine how the addition of substances with various pH values affects the oxidation of fruits and vegetables. The hypothesis was- if lemon juice is added to the fruit/vegetable, then the oxidation process will slow down the most compared to the other substances. The 6 different pH substances- tap water, salt water, baking soda solution, milk of magnesia, lemon juice, and vinegar- were put on 6 pieces of the fruit/vegetable and the last piece had nothing on it, serving as the control. The surface area of the ingredients was observed based on how many squares in the grid cut out on the surface of the ingredient were filled. We recorded our data

after 5 min, 15 min, 25 min, 2 hours, and 24 hours, converted the information into percent, and found the average. Three trials were completed per ingredient and the data was analyzed using a t-test. Based on the results, using an acidic substance such as lemon juice would be more effective to use in preserving ingredients compared to the other substances. The least effective substance was the milk of magnesia and the baking soda for most of the data, showing that basic solutions might actually speed up the oxidation process, rather than slow it down. It was observed that acidic substances slow down the browning of the ingredients better than any other substance.

316-12 Gatorade vs. Powerade: who has the most electrolytes?

Robert Kosinski

(Roehrich – Products)

For years Gatorade and Powerade have been used by athletes all over the world to resupply their amount of electrolytes in their bodies. They both were long life rivals for many years. Electrolytes are salts that contain sodium, potassium, chloride, and bicarbonate. They leave your body in the form of sweat. They leave when you perform physical activity. Sports drink bring back the amount of electrolytes in your body. Electrolytes do not only resupply energy but send electrical impulses to and from your cells to keep your kidney functioning. Its for this exact reason why electrolytes are so vital. Both companies say their sports drink offer the most electrolytes but who really gives the most?

318-20 The effect of color upon our cone cells

Elizabeth Krasner

(Roehrich – Medicine)

This experiment tested which color would stimulate the cone cells in our eyes the most, creating a more lasting effect. Afterimage is an important aspect of this project because the different cone cells, the cells in the eye, respond to light and are responsible for color vision, are activated creating an afterimage, aiding the person in remembering the image or words. Ten subjects were given a set of fifteen words for each of the six colors: black, red, blue, yellow, green, and multicolored. The set of words that were typed in black was the control because most of people's notes, papers, writings, are in black so our eyes are used to it as well as the fact that black is in itself a color that absorbs all other colors. The timing for each trial for 2 minutes, six times, once for each color. When counting up the results, they were remarkably close. However, the t test results showed that the trial with the red color was higher at 2.380289 while blue, green, and yellow and multi were 0.7982, 1.295798, 1.031644, and 1.092553 respectively. In addition to having a higher t test value, the red color also had the highest level of accuracy during the degrees of freedom test. Red had over 95% accuracy while the rest all had below 90% accuracy. These results have confirmed my hypothesis which stated that the red color would be the best in helping a person retain a certain type of information.

320-19 Borax and glue ratios on silly putty polymers

Marco Kwan

(Roehrich – Chemistry)

Borax and Glue undergo a chemical reaction called polymerization, which forms bonds between borax molecules and Borax molecules. Determining which homemade recipes reveals the best 'silly putty' sample by utilizing a vary of different ratios of ingredients, 4% Borax and 50% glue will show how different portions of Borax and Glue will react with each other. Studies have shown that linking of two borax molecules and glue molecules called polymer cross-linking create a bigger polymer molecule, which is less liquid and more solid. This shows that Borax and Glue do not create a liquid solution but more of a solid-liquid one instead. This also proves our prediction that more glue molecules create a more elastic putty. The purpose of this experiment is to determine how different ratios of 50% Glue and 4% Borax will give the most 'elastic' property. By testing different ratios and record time trials for how elastic each recipe is, it is proven

that more glue ratio gives stronger bonds to the putty. Stronger bonds will reveal a more elastic property. It was predicted that more portions of the glue will average more seconds because the glue molecules are more necessary to build a thicker and stronger bond between the borax and glue. The results show that more portions of 50% glue than 4% Borax gave a more elastic property.

318-07 Natural vs. Store-bought cleaning agents

Davina Lall

(Roehrich – Microbiology)

Bacteria are all around us even though we may not see them. Some are hazardous to our health and can cause illness. To prevent illness, we need the environment around us to be clean. To achieve a clean environment, we must use effective cleaning agents. My project tests the effectiveness of natural cleaning agents and store-bought cleaning agents against killing bacteria. The natural cleaning agents that were tested were lemon juice, baking soda and vinegar. The store-bought cleaning agents that were tested were Lysol, Clorox and Pine-Sol. Water was also used as the controlled variable. I hypothesized that the store-bought cleaning agents will kill more bacteria. I performed this experiment by first cutting up a strawberry on a cutting mat and then waiting five minutes for the stain to dry. After five minutes, I poured 3 mL of a cleaning agent into a 10 mL graduated cylinder. Then I poured the cleaning agent onto the cutting mat and wiped the mat until the strawberry stain was no longer visible. Next, I swabbed the cutting mat using a cotton swab. The tip of the cotton swab was then rubbed onto the agar plate. I repeated this process for each cleaning agent. The agar plate was incubated upside down at 25 °C. I also recorded the bacteria growth for each day. After reviewing my data and performing a t-test, the outcome of my project was that the store-bought cleaning agents killed the most bacteria. So my hypothesis was supported.

319-18 The effect of different juices and brands on vitamin c levels

Daniela Lara & Josephine Zhen

(Sullivan – Products)

In this experiment, the levels of vitamin C were measured in different fruit juices. We were measuring for 3 different things: which fruit juice had the most vitamin C, if brand or non-brand juices had the most vitamin C, and which brand of orange juice had the most vitamin C. An indicator for vitamin C is 2% tincture of iodine. The purpose of testing vitamin C levels in fruit juices is to see which one has the highest content of vitamin C. The juice with the highest vitamin C levels will be the most worth it to purchase. In order to keep the experiment as accurate as possible, an important variable to keep controlled was the number of drops of iodine put into the water. We found that out of all the other juices, orange juice had the highest vitamin C content, with the lowest number of drops on average needed to turn the iodine solution clear (63 drops on average). We also found that most of the non-brand juices had a higher vitamin C content compared to the brand name juices. Lastly, when comparing different orange juice brands, the brand that had the highest vitamin C level was Florida's Natural.

316-16 Does electricity stimulate plant growth?

Jessica Lauv

(Sullivan – Plants)

My experiment tested the effect of electricity on plants. To go about my experiment, I had to first create a natural electrolytic cell. For my experimental group, I placed a copper strip on one end, and a zinc strip on the opposite end. They were then connected by crocodile clips and a wire to allow electrons to flow. I watered the plants 60 mL per day and allowed equal sun exposure to all plants. My results show clearly that the experimental group had a greater total average height per centimeters. In addition, I performed a t-test and my findings include the experimental group's higher total average being statistically significant at a 95% confidence level. This method is valid and may be implemented into society as well as our lives. For instance, farmers may be

able to increase yield per acre, or we may also simply use this method for gardening in our free time.

314-03 The effect of acne cleansers against *M. luteus*

Asia Le & Venus Fu

(Sullivan – Products)

We tested acne cleansers against *M. luteus*, a bacteria that can be found on the skin. 6 products were tested and we did 10 trials. The acne cleanser with the largest zone of inhibition was the acne cleanser that worked the best.

314-18 Effectiveness of antibacterial soaps on *E. coli*

Joanne Lee & Austin Lau

(Sullivan – Microbiology)

Everyday people are finding new ways to improve their hygiene. In this project we tested the effectiveness of different types of antibacterial soaps on *E. coli*. *E. coli* is a gram negative bacteria that is found in our stomachs and it helps us digest our food. Certain strands can cause abdominal pains. We hypothesized that Dial hand soap would be the most effective against *E. coli* because it contained Triclosan, which most widespread stands are not resistant to. We spread the bacteria onto a nutrient agar plate and placed disks of the antibacterial hand soaps onto the plate. Once the plates were ready we measured each zone and recorded it. Our hypothesis was supported and Dial was the most effective against *E. coli* averaging higher zones of inhibition.

319-23 The effect of senses on memory

Karen Lee

(Roehrich – Behavior)

The purpose of my experiment is to find out whether or not incorporating an additional sense would aid in improving a person's memory. My hypothesis was that having and using an additional sense would improve a person's memory. Researchers ran similar experiments, mainly focusing on one set of senses and not all. For sight vs. smell, researchers found that a certain smell like rosemary improved a person's memory. This supports one of my results since memory did improve when the sense of smell was stimulated. The averages of the amount of words remembered increased by two or more when comparing words recalled with sight alone and with sight and another sense. All the t-tests that compared memory based on sight alone and sight with an additional sense all exceeded 98% confidence which shows that there was a significant change with the additional sense. Based on the data, adding an additional sense other than sight does improve a person's memory. This experiment could be relevant to society because it can find a way to help people who don't have great memory in their everyday lives. It could provide a way to help a student remember his/her vocabulary words easier or information for the history test; it could also help an adult memorize their shopping list with the use of items that can be found in everyday life.

319-06 Life or death ~ the effect of pH

Victor Lee

(Ross – Environment)

Throughout the world, vegetation is grown in areas where acid rain is common, such as areas in highly populated cities. Within recent years, acid rain has become stronger, and pH values are found lower than 4 in some areas, the point in which fish die in lakes. Low pH values are found in areas of China and other heavily polluted cities. Through this experiment 44 plants were sown in small plastic cups that were filled with about 1 inch of pre-fertilized soil. Using the formula, $-\log(\text{molarity})$, the pH of the water could be found. The pH of the water was altered using 1M HCl, and 1M NaOH. Using these water samples plants were watered daily during the two week growth process. From these findings, majority of the plants within the pH range of 3-10 were able to grow

roots; however, only majority of the plants within the pH range of 5-10 were able to successfully germinate out of the soil. Using ANOVA testing, the p value of 0.046 was obtained, and from that value it shows that there is a significant difference between the values obtained, so therefore, pH value does affect the growth of plants. There were several discrepancies found within the values, such as the plant that germinated from the pH group of 12, and it oddly was the largest and tallest plant. The hypothesis was supported, as it was hypothesized that plant growth will be affected by the pH of the water source.

316-11 The effectiveness of cleaning products on E. coli

Maura Lima & Karen Cruz

(Roehrich – Products)

In the experiment, the effectiveness of cleaning products containing ammonia and non-ammonia were tested to see which would kill more E. coli. The experiment was to use four cleaning products with ammonia and test them against four non-ammonia cleaning products. E. coli was spread over agar plates and they were split into 3 parts, the control, one disc with cleaning product containing ammonia, and one disc with cleaning product containing no ammonia. The plates were then incubated upside-down over night at 37 °C and examined the next day and the results were observed and measured. According to the t-test, the hypothesis was refuted because there was not a significant difference between the amounts of bacteria killed by cleaning products with ammonia and without ammonia. The t-value result was a total of 0.688, but to pass the t-test a result of 1.94 is needed. The actual results on the zone of inhibition for the cleaning products did support the hypothesis. The results supported the hypothesis because the two averages of the cleaning products showed that the ammonia products were more effective than the non-ammonia products. The ammonia products had an average of 8.5 mm while the non-ammonia products had an average of 7.7 mm, having a difference of 0.8 mm indicating that ammonia cleaning products kill bacteria, E. coli, slightly better and more effectively.

319-08 Electrolytes in beverages

Jessica Lin & Eileen Chen

(Roehrich – Physics)

This experiment was conducted to determine which beverage contained the greatest quantity of electrolytes. My partner and I hypothesized that if we test different types of beverages, then the sports drinks will contain the highest conductance, and therefore the greatest quantity of electrolytes. Electrolytes are salts, specifically ions that are electrically-charged. Electrolytes are lost in the fluids we sweat during heavy exercise. These electrolytes must be replaced to keep the electrolyte concentrations of body fluids constant. In order to measure conductance, we first needed to construct a circuit connecting the multimeter to the liquid to measure its current. We wrapped copper wire around both ends of a 1.5 inch straw and attached them to the battery and multimeter using alligator clip wires. We set our setting to 10 A on the multimeter and we recorded the current of each beverage for 15 trials each. Afterwards, we used the formula $G=I/V$ to find our conductance and then compared the conductance between the sports drinks and the regular beverages. It was calculated that sports drinks had an average of 4.502 millisiemens and the regular drinks had an average of 3.248 millisiemens. However, orange juice contained the highest conductance compared to any other beverage. Our hypothesis was supported because sports drinks generally did have a higher conductance and therefore, a greater quantity of electrolytes than regular beverages.

314-22 The effect of microwaved water on living organisms

Diane Ling & Krisalee Hibbert

(Ross – Plants)

This project is about testing two different types on water on different organisms to see its effect on them. The purpose is to see if microwaved water kills plants. The control is tap water and the experimental is going to be microwaved water. The water will be tested on two different types of organisms, sweet william plants and brine shrimp eggs. The amount of plants grown and eggs hatched will determine the effectiveness on each type of water. The plants were watered five times a week with the two types of water. The brine shrimp eggs were placed in an aquarium salt water solution and placed overnight to see results. All the organisms were left under light. The hypothesis of this experiment is that the microwaved water would not suit the organisms best, meaning that less will hatch. After ten days of watering and observing, more of the tap water plants had grown and they grew taller than the microwaved water plants. In addition, the brine shrimp eggs showed more hatched babies in the tap water solution than the microwaved water solution. This concludes that tap water is more beneficial and ideal to use when it comes to living organisms. Microwaved water delays growth in living organisms.

318-11 Whiter teeth, brighter smile!

Donika Lleshi

(Ross – Products)

In this experiment, three brands of toothpaste were tested to see which one whitens better, Colgate Total, Crest Whitening, or Aquafresh Whitening. Porcelain tiles were used to represent teeth. Coffee was used to stain the tiles. The porcelain tiles were stained with coffee by spilling a little coffee on the tiles and letting it dry. Once the coffee was completely dried up the three different brands of toothpaste were used to clean the stain on the tile. One tile was used as a control, it was only being washed with water- no toothpaste. The tiles were observed and the results were recorded. This procedure was repeated several times. Each brand of toothpaste had ten trials totaling up to 30 trials for all the toothpaste. The control tile also had ten trials which brings the total number of trials in the experiment up to 40. This experiment lasted about one week with experiments done at school. After all the trials and observations, it was clear on which toothpaste whitens better. The Colgate Total worked best- it was stained but the stain was not as noticeable as the others. Crest Whitening came in second, the stains on this tile were clearer and more visible than those on the Colgate Total tile. Aquafresh was the worst toothpaste to use for whitening because the stain on this tile was very similar to the stain on the control tile. It was a yellowish stain with brown corners. Note this experiment tests the whitening of the toothpaste and not the germ killing power. Research show that it is the amount of baking soda and other chemicals that affect the whitening along with how much calcium you have in your teeth. Therefore, this experiment supports my hypothesis and out of the three brands, Colgate Total is the best toothpaste to use for whiter teeth.

318-21 Gumcentration

Vanessa Mai

(Roehrich – Behavior)

The purpose of this experiment was to determine whether or not gum affects one's ability to concentrate and if so, which flavor of gum is most effective in increasing concentration. Based on prior research, I hypothesized that peppermint flavored gum would increase one's concentration the best because of its strong flavor. The strong flavor of peppermint gum has the power to raise one's alertness, therefore allowing the participant to become more focused in their work. Furthermore, chewing gum allows an increase of oxygen to flow to areas in the brain where attention is held, resulting in an increase in one's concentration. Based on observations from my collected data, the final result supported my hypothesis. The participants chewing peppermint gum did

the best in completing the most two-digit multiplication problems correctly with a given time of two minutes. This result overthrew the results of the participants who completed the worksheets with other flavors of gum and without gum at all. This study of how gum can expand one's concentration can help the outside world because gum can assist students with their concentration in school. Although many schools have created rules that prohibits students from chewing gum in class, chewing gum can aid students to better understand information learned in class, maintain their focus in class, and potentially increase test scores.

318-14 Wavenumber in ionic solutions

Samuel Makarovskiy & William Dadario

(Roehrich – Chemistry)

Wavenumber of an electric current, the number of times a wave oscillates over a given distance, varies with the substance it passes through. The purpose of this experiment was to see how the wavenumber of an electric current was affected if it was passed through an ionic solution, and then the difference in wavenumber would be proportional to the change in energy of the current. A circuit was constructed from three jumper cables, a voltmeter, two copper wires, a 9-volt battery, and a 250 mL beaker with the solutions to be tested. In the beaker we would pour 0.1 molar solutions of NaCl, KCl, KI, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, KOH, HNO_3 , and $\text{HC}_2\text{H}_3\text{O}_2$ to test how they would compare with the base wavenumber of 19.6 per 200cm found in a typical circuit. After testing each solution three times, t-tests were run comparing the wavenumbers of each solution with the tested 19.6 of the control. Most of the substances tested had a significant difference in wavenumber when compared to the control according to the t-test because all their assurance values were over 95%. The only substance found to have an unacceptable assurance value was $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ at a value under 90%. These results signify that all the substances, excluding the $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, are worse at preserving an electric current's wavenumber than insulated copper wire. This means that those substances are worse conductors of electricity than copper wire because a decrease in wavenumber signals a decrease in frequency and overall energy of a wave.

318-12 Yeast reproduction in sugar substitutes

Kenny Gene Malasarte

(Roehrich – Products)

Yeast are single -celled fungi that derive their energy from sugar. Their used in our everyday lives and are usually used to make bread dough rise. As yeast reproduce they release CO_2 . My experiment is to see which Sugar Substitute is able to allow the yeast to release the most CO_2 . By using the displacement method gathered the averages of plain sugar, Equal, Splenda, and Sweet N Low since these are very common household sugars. My results showed that neither of the sugar substitutes actually came close to plain sugar that produced 256.75 mL of CO_2 while Splenda being the closest only had 212.25 mL of CO_2 . My hypothesis was correct, Splenda did produce more.

320-14 Type of music on concentration

Ahsan Malik

(Roehrich – Behavior)

Scientists have studied in the past whether music has an affect on a person's concentration. The results have varied but it has been said classical music helps to concentrate the best and some have said music is a distraction. Many people listen to music while studying or doing homework believing that it can speed up the process. Past studies have also shown music activates the brain making it more aware and more capable of retaining information. It is said classical is the best music since it doesn't contain lyrics such as Beethoven-Moonlight Sonata and is more relaxing/soothing. The purpose of this experiment was to test this theory and determine whether it is true or just another accusation. 10 test subjects were selected with 5 being males and 5 being females consisting of sophomores. The test subjects were given word searches

consisting 19 SAT words. They were each given 3 minutes to find as many words as they can and the amount of words found was recorded. There were 5 different word searches for each of the 5 categories, which were rap, classical, rock, country, and control or no music. The word searches were made a little difficult intentionally to make the test subjects really work. The results showed music does have an affect on completing task and speeds up the process. Classical music was the best tied with rock with an average of 4.1 words while control had an average of 3.2 words. This shows music does have an affect.

316-07 Effectiveness of the OxiClean Gel-Stick: Hot vs. Room temperature

Madina Malik

(Ross – Products)

Many mothers have been faced with the problem of getting out tough, set in stains, and this dilemma has existed for decades. When all hope was lost, most people would throw away the stained clothing and consider it ruined. However, the OxiClean Max Force Gel-Stick has been advertised to remove difficult, everyday stains, so the purpose of this experiment is to see just how well it does the job. For this experiment, cotton cloth squares were stained with 5mL of either Pepsi, coffee, grape juice, tomato juice, or vegetable oil depending on the trial. Five trials were conducted with the fabric soaked in hot water, as well as five trials with room temperature water, which was the control. After a given amount of time, the fabric was wrung out and the diameter of the stain was measured. Upon conclusion, the data showed that the Gel-Stick did in fact work at removing the stains, but it worked better with hot water rather than room temperature water.

319-19 Does music have an affect on plant growth?

Christine Manukov

(Roehrich – Plants)

This experiment was to help discover if music allows plants to grow at a quicker rate. To do this you must play a certain genre of music, precisely the same song to the experimental group of plants for different durations of time. While the experimental group is receiving its daily nutrients and also being played music, the control group must receive the same nutrients such as water and sunlight, but must not be played music. The music I chose for the experiment was classical, specifically Vivaldi's composition Four Seasons. I chose classical music because after researching if music will affect plant development, I had read that the genre of classical music proved to show the most affects. The purpose of this is to visually see if the music has an affect on plants by recording the plants growth in height. I hypothesized that music will affect the plant growth and in fact, accelerate the development. The reasoning for this is that the sound waves that travel from the music act as stimuli for the plants. After conducting the experiment, the data collected proved my hypothesis to be true. Classical music did show rapid plant growth in the experimental group rather than the control group and vaguely in shorter time periods than longer ones. From the experiment further research can be directed to see if possibly other genres of music may influence plant growth. This information also aids society today because it may allow agricultural systems to have faster growing rates.

320-16 My plants need vitamins!

Tyra Mendieta

(Ross – Plants)

When flowers are planted they require sunlight and water in order to grow. However, what about vitamins? Naturally for plants to grow, they require Vitamin C which relieves a plant from stress and drought. Nevertheless is Vitamin C the only vitamin that plants have the need of? The experiment conducted was to see whether Vitamins D and C had an effect on the growth of the plants that were grown. There were four groups in total: the control group that required of only 100 mL of water per plant, the

vitamin D group that consisted of 1 g of vitamin D mixed with 100 mL of water, the vitamin C group that consisted of 1 g of vitamin C mixed in 100 mL of water, and finally the vitamin D+C group where 0.5 g of vitamin D and 0.5 g of Vitamin C are mixed together in 100 mL of water. During the first few days of conducting the experiment no results were shown, however, during the fourth day some of the plants began to sprout. Control plants had a height of 1.5 cm, while Vitamin D plants had a height of 1 cm, Vitamin C plants had a height of 2 cm, and vitamins D+C plants had a height of 2.2 cm. Overall, the results lead to the conclusion that the hypothesis, of Vitamins D+C having the most effect on plant growth, was supported due to the fact that it had the largest height of all four groups.

319-03 Road salt's effect on plant growth

Maya Miller

(Ross – Medicine)

Every year people are faced with the problem of snow. Snow makes it both difficult and dangerous to drive, walk and overall navigate in the winter time. The most common solution used for snow accumulation is road salt. This project's purpose is to investigate road salt's effect on plant growth. In order to determine whether road salt does have an effect on plant growth, the experimenter harvested bean plants. Then, the plants were separated into four different groups including a control group and labeled accordingly. Each group was then watered daily with a different brand of road salt, but were all watered with same amount of mixture and each mixture all had the same concentration of salt and water. The exception to this was the control group which was watered with tap water. The road salt is made into a mixture in order to mimic runoff which is the common way salt gets into soil. This was a daily process which was then repeated for a week. Each day the plants were measured and compared. After being watered and measured for the day the plants were put under a grow light for the remainder of the school day. After the school day was over, the grow lights were shut off until the next morning. This was done to simulate the sun as closely as possible. The experiment's results supported the hypothesis's claim. The road salt did have an effect on plant growth. However, some brands were worse for the plant as well as the soil than others. These results can be used to stop the use of road salt and hopefully there will soon be safer alternatives for road salt.

316-10 Which mouthwash brand kills the most bacteria?

Annemarie Moran

(Ross – Products)

This experiment tested five brands of mouthwash and their ability to kill bacteria. Scope, Crest, Colgate, Listerine, and CVS brand were the five mouthwashes used. It took place over a two-week period. The materials used were twenty-five agar plates, distilled water, plain disks, a spreader, pipette, forceps, flame, caliper, and alcohol. The bacterium that was used was micrococcus. The best mouthwash brand would be the one that had the greatest average zone of inhibition. The hypothesis of this experiment is Listerine will kill the most micrococcus bacteria. The hypothesis was not supported because the results proved that the CVS brand mouthwash was the most effective mouthwash with an average zone of inhibition of 46 mm. The least effective mouthwash was Scope with an average zone of inhibition of 20 mm. The experiment proved that the big name brands were generally the least effective at killing bacteria.

319-11 How does an acid and a base affect E. coli growth?

Guadalupe Naula

(Roehrich – Microbiology)

The objective of this experiment is to investigate the effect of an acid and a base on E. coli growth. If the solutions containing 20% concentration of vinegar and Windex make the greater inhibition zones will also be determined. The independent variable is the concentration of the vinegar and Windex in a solution with water as its solvent. The

different concentrations are 10%, 15%, and 20%. The dependent variable is the diameter of the inhibition zones measured in millimeters. In this experiment, vinegar will be used as an acid since it has a pH of 2.2 and Windex will be used as a base since its pH is 10.0. The purpose of the experiment was determined by putting the different concentrations for each on paper disks, which would be put on the agar plates containing E. coli. The plates would be then incubated for one night at 37°C and the inhibition zone would be measured with a ruler. Vinegar and Windex created inhibition zones around the paper disks which means that some acids like Vinegar and bases like Windex kill bacteria. The solution with 20% concentration of vinegar and Windex caused the largest inhibition zones, supporting the hypothesis. This is since the data shows us that the mean of the inhibition zones with 20% concentration for vinegar and Windex were larger than the means of the other concentrations.

316-22 The effect of carbonated drinks on the human body

Vivian Ng & Ibraar Aziz

(Roehrich – Medicine)

Carbonated drinks, like soda are one of the most popular beverages in the average American diet, deemed since 2005, according to the FDA. These drinks are three times more popular than bottled water and milk. When consumed these beverages can alter pH levels depending on how basic or acidic the beverage is. Specifically, the average pH of our blood, which lies between 7.35-7.45. According to researchers, over time the consumption of these beverages have a negative impact on our health. Our experiment and research were used to determine the effects of our health in the long run after the consumption of carbonated beverages. In order to conduct our experiment we tested the pH and the carbonation of various brands of soda and homemade soda to see which would have a larger impact on the human body. Along with pH we tested carbonation as well. Based upon research not only did we discover that these beverages have negative impacts on us as adolescents, but they also have negative impacts on us in the long run as adults, and current adults as well. Based on quantitative data acquired throughout the experiment, it indicated that the varying pH levels of store bought soda were much lower than homemade soda, which indicated that store bought soda was more acidic. This data indicated that when these beverages are consumed, they would change our body's pH levels, which is crucial, when these levels should be balanced, in order for us to stay healthy.

318-01 How much weight can fishing line actually hold?

Joseph Parziale

(Sullivan – Products)

This experiment was conducted to see how much weight fishing line can actually hold. While fishing various fishermen will catch fish that weigh more than what their line says they can handle. Also, many people spend more money on heavier lines so they can catch certain fish of certain weights/sizes. This raises the question; can fishing line hold more than what their manufacturer say they can? The lines that were tested were two common lines for pier fishing. These were 4lb. test line and 10lb. test line. A test is how much the manufacturer said the line could hold on average. This experiment was conducted by adding weights (in grams) into a bucket that was tied onto the end of a fishing line suspended from a ring stand. Weights were added to the bucket until the line could hold no more and it collapsed. The experiment showed that fishing line can hold around how much their manufacturer said they could. The average weight held for one brand of 10lb. test line was 10.27 lbs. There were discrepancies found, this was the average for the amount of weight that the Zebco brand of 10lb. test line could hold. It held less than 10lbs. (8.07 lbs.) while the Berkley brand held a little more/ close to 10lbs. of weight. My hypothesis was refuted.

316-01 Where are you growing?

Gillian Patrick

(Roehrich – Microbiology)

This experiment was performed to see which temperature will produce the most percentage of bacteria grown among the agar plates. I believed that the plate kept at 37 °C would produce the most bacteria. I believed this because at higher temperatures, bacteria reproduces at a faster rate by binary fission causing there to be a higher percentage of bacteria. The 25 °C plate and the the 37 °C plate were put in incubators overnight for each trial. The 3 degrees plate was put in the refrigerator overnight for each trial. I used the sink and the light switch as the environments to test the temperature on because those two environments generate a lot of bacteria especially the sink. By using those environments it will provide me with a substantial amount of bacteria to draw conclusions with. The percentages for the 10 trials and environments (sink, light switch, and control) were recorded and then averaged. After calculating the variance and t test, there was not a significant difference between the percentages of bacteria on the 37 °C and 25 °C plates but there was a significant difference between 3 °C plate compared to the 37 °C plate and the 3 °C plate compared to the 25 °C plate. The t test also passed. There could have been factors that affected the results and ways that could have made the results more accurate.

316-15 Detergent vs. Stain

Kimberly Pichardo

(Roehrich – Products)

The purpose of my experiment is to investigate which detergent brand is most effective in regards to removing tough stains such as coffee, BBQ sauce, and ketchup. I hypothesized that Tide (Ultra Stain Release) will be the most effective and will remove the stains best. I believe this because Tide has been U.S number one laundry detergent since its establishment and also Tide is known for being high in concentration while other leading detergent brands are diluted and mainly consist of water. My control was to stain 3 pieces of cloth with the following stains; coffee, ketchup and BBQ sauce and let it sit for 12 hours. Then I washed each cloth individually for two minutes in warm water only and left them in room temperature to dry. My experimental process was to conduct 3 trials for each of the following detergents; Tide (Ultra Stain Release), Purex (Dirt Lifting Action), Gain (original) and Arm & Hammer OxiClean. I repeated the same steps from my control for my experimental; however I used one of the following detergents assigned. My results supported my hypothesis; Tide was able to get rid of the stain the best and in the least time. This proves Tide is the most effective in regards to removing tough stains but Arm & Hammer was not too far behind from also being one of the most effective.

314-14 A change in the winds: Bernoulli's principle

Joshua Pilipovsky

(Roehrich – Engineering)

Bernoulli's Principle is a hallmark of aeronautical engineering and fluid mechanics. It states that when the velocity of a fluid increases, the pressure exerted by it decreases. To conduct the experiment, cans were placed equidistant from each other, using a ruler to measure the distance. Then, the blow drier was positioned exactly between the two cans and at the moment when it begins, a stopwatch starts. When the two cans touch, the stopwatch would be stopped and the allotted time is recorded. The results showed that as the speed of the blow drier increased, the times of the cans to touch decreased. The cans touch because the high pressure coming from the room is going towards the low pressure coming from the blow drier, forcing the air to push the cans to one another. Also, through the data, it was noticed that as the distance between the cans increased, it took longer for them to touch. This is because the pressure from the inside has to go all the way around to the outside pressure and the resulting pressure gradient is too small and thus the force is too weak to move the cans enough to touch. Applications of

Bernoulli's Principle can be found in the airfoil of an aerodynamic wing, where the low air pressure pushes up on the wing to produce a lift on the plane. Other applications can be found in the design of a baseball, a sail boat, and in general it is ubiquitously used.

320-17 How do levels of carbohydrates differ in different types of milk?

Melissa Placencio

(Roehrich – Chemistry)

Milk is said to be the most nutritionally complete food in nature. Milk contains 'vitamins (principally thiamine, riboflavin, pantothenic acid, and vitamins A, B12, and D), minerals (calcium, potassium, sodium and phosphorus), and proteins (mostly casein), and carbohydrates (principally lactose), and lipids (fats).'(Ebe, 1997)If milk is the 'most nutritionally complete food in nature' shouldn't we all be drinking it? We should all be drinking milk, but over 40 million Americans are lactose intolerant, meaning that they can't drink milk without digestive problems. Since the main carbohydrate in milk is lactose, one could find which milk has less lactose by extracting the mass of carbohydrate from the milk. In this experiment both whole milk and soy milk were tested. After isolating the carbohydrates from the milk, the mass was weighed and recorded and several trials were done with both types of milk. If we find which milk has less lactose, we could find the milk that would be digested easier by those who are lactose intolerant. A t-test was done to find if there was a significant difference between mass of carbohydrates per 100mL of milk, the data failed the t-test. This means that there is not a significant difference between the mass of lactose in whole milk when compared to soy milk. A better conclusion could be drawn if we had more trials and more varieties of milk to test. If one is lactose intolerant, we should try and see what type of milk causes less digestive problems.

314-20 Which orange juice has the most vitamin c?

Kevin Platonov

(Roehrich – Chemistry)

The purpose of this experiment is to investigate different types of orange juices and see if freshly squeezed orange juice has the most concentration of vitamin C. The orange juices that will be compared are freshly squeezed, concentration orange juice, and pulp orange juice. They will be compared to a standard vitamin C solution with the known concentration of Vitamin C. To find the concentration of vitamin C the method is called titration. Titration is a way to measure the unknown amount of a solution by adding a measured amount of a chemical with a known concentration. The results can be calculated with a ratio of the two chemicals and solve for the missing variable. By doing this experiment it can help find a healthy supplement of vitamin C, for people who don't have enough of it.

314-19 Is permanent marker truly permanent?

Ida Polishchuk

(Ross – Chemistry)

The purpose of this experiment is to test different substances that we so call cleaning products and test to see whether they will remove the fully dried sharpie stain for each of the following surfaces such as wood, plastic, foil, cotton, and paper. To begin my experiment I took the same amount of each substance and a brand new sharpie marker. Along the middle of each material, I drew a thick bold line with the marker. I let the marker dry for 10 minutes on each surface. Then I took a cotton swab and dipped the swab in each of the 10 substances some of which were water, alcohol, soap, oxy clean, and acetone. I rubbed a small piece of the line for 30 seconds with the substance with the q-tip. I did this 10 times for each substance on each surface. I noticed that the flattest surfaces were the ones that let off the sharpie the best. Cloth has a surface with lots of pores and that absorbs the ink very well making it hard to take off. However, the foil had no pores therefore, with certain substances it came off 100%. In conclusion, the

alcohol and tributene took off the marker fully and completely from the foil and the plastic wrap but no substance could fully remove the stain of the sharpie from the paper, wood, and cotton. These results show that from all the removers there are simple household rubbing alcohol works best.

318-09 The effect of different solvents on solutes

Diana Polonska

(Sullivan – Products)

Chromatography is a process in which mixtures are separated by using a solvent to carry a solute up filter paper. The purpose of this experiment is to find out which solvent should be used in cleaning products used to remove marker stains. The two solvents used in this experiment were acetone (organic compound) and ethanol alcohol (pure alcohol). These 2 solvents were tested on 3 different markers. It was hypothesized that the acetone will work best to separate the marker on the filter paper because as a ketone, the acetone is able to dissolve both polar and non-polar substances. The results supported the hypothesis because the acetone did work best to separate the 3 markers across the filter paper. This shows that the acetone was best at dissolving the markers. In conclusion, acetone would be best to put in cleaning products used to remove marker stains.

320-12 The impact of different types of music over memory

Nafisa Rahman

(Ross – Behavior)

Many students tend to listen to music while completing significant tasks such as homework. Is listening to music beneficial to the human mind? This question had lingered in many students' minds, yet these same students decide to continue doing so without figuring out whether or not they are helping themselves. Music has become a significant factor of many people's everyday lives yet no one knows whether it's effective. This experiment is testing the effect of music over the human brain, specifically memory. This experiment aims to test whether or not it is a good idea to listen to music while completing significant tasks and if so, which type of music is the most beneficial. To determine this, a series of 4 trials are taken in which a given sample size of 20 kids are asked to memorize as many words as they can from a 10 worded vocabulary list while listening to 3 different genres along with a controlled variable. They were each given 1 min to memorize and 1 minute to record as many words as they possibly could. In this case, the controlled variable is the trial done in silence. The other 3 trials are done while listening to rock, pop and classical music. These genres differentiate in dissonance level for more accurate results. The results were astonishing as it turns out, low dissonance level is better than no music at all, meaning classical music is the most effective completing important tasks compared to rock, pop, and silence.

316-02 Effectiveness of spices on bacteria

Abrar Rais & Kieran Bissessar

(Sullivan – Products)

Spices are commonly used in foods all over the world however spices also provide health benefits such as fighting bacteria. In this experiment, we tested to see which spice was most effective against E. coli. To test the effectiveness of the spices, we spread E. coli onto an agar plate which was divided into 4 sections, one for control and the other 3 for the spices. We repeated these steps for a second agar plate in order to test 6 spices. Each section received one plain disc dipped into the according extract of that section. Each agar plate was then incubated overnight and then measurements of the zones of inhibition were taken the following day. After the completion of all the testing, cinnamon was the most effective against E. coli. This testing proves Cinnamon is recommended in a healthy diet.

319-16 The effect of citrus fruit on the growth of *Micrococcus luteus*

Nicole Rakhmanova

(Roehrich – Microbiology)

The purpose of this experiment is to investigate which citrus fruit is more effective in inhibiting the growth of *Micrococcus luteus*. The hypothesis states that if the effectiveness of different citrus fruits (lime, lemon, orange, and grapefruit) are tested on *Micrococcus luteus*, then the orange will be most successful in inhibiting its growth because oranges contain more salicylates than the other fruits and salicylic acid works as an antiseptic against bacteria. This study is important because the inhibition of nonpathogenic *M. luteus* can represent how citrus fruits may affect other harmful gram positive bacteria. Using natural fruits as antibiotics could potentially prevent antibiotic resistance and side effects. To carry out the procedure, two agar plates were utilized for each trial for a total of ten trials (each was divided into either control, lemon and lime or control, orange, and grapefruit). Antibiotic discs were dipped in distilled water for control and the hand-squeezed fruit juices and placed on their designated regions. All standard laboratory procedures were tended to. The plates incubated at 37 °C, the ideal temperature, and zones of inhibition were recorded. The hypothesis was incorrect. Lemon was found to have the greatest average zone of inhibition (17.9 mm) and was most successful in inhibiting the growth and reproduction of *Micrococcus luteus*. Lemon contains higher levels of citric acid than the other fruits do, so such factors should be investigated for accurate conclusions. The t-values support this with high confidence levels (99%).

318-03 Effect of colloidal silver on bacteria

Daniel Rebibo

(Sullivan – Microbiology)

Colloidal silver is commonly believed to have antibacterial properties, making it potentially useful for wounds. The correlation between silver concentration and antibiotic ability is being tested here, so that it could be used effectively for daily life. Concentrations with 500,000, 5,000, and 50 ppm were tested to see which would create the largest zone of inhibition. The largest concentration created zones of inhibitions averaged 51mm while the others had no zone. Therefore, for effective antibiotic abilities, the concentration of silver has to be fairly high.

318-13 The effect of concentration on bacteria growth

Rebecca Regine

(Roehrich – Cellular)

E. coli is a gram negative bacterium that is the cause of common bacterial infections. Dettol antiseptic liquid is a disinfectant made up of 4.8% chloroxylenol which kills bacteria and provides protection against germs that cause infection. The purpose of the project was to see how the concentration of Dettol effects the growth of *E. coli* bacteria. The student used different concentrations of Dettol, 25%, 50%, 75% and 100%, with 100% being the control. This can be globally influential because it shows that diluting disinfectants is not as effective as the original product. After spreading the *E. coli* on the petri dishes, the student dipped filter paper in the concentration being tested. Then it was incubated over night and the data was recorded the next day for the zone of inhibition. The results confirmed the student's hypothesis and showed that there was a direct relationship between concentration and the effectiveness of the disinfectant. As concentration increased, the zone of inhibition increased. The t-test showed significant differences between 25%, 50% 75% and 100% concentrations, which means that concentration has an effect on the effectiveness of the disinfectant.

316-03 Which over-the-counter drug dissolves the fastest?

Shanayah Renois

(Sullivan – Biochemistry)

Many people buy over-the-counter (OTC) drugs for pain relief or fever reduction. But which one dissolves fastest in your stomach in order to get into your circulatory system faster and thereby the site of inflammation? I dissolved four Bayer tablets and twelve caplets (Tylenol, Motrin, and Advil, four of each) in HCl and timed it. Tablets lack the harder coating that caplets have, so my hypothesis was that the Bayer tablets would dissolve the fastest. My hypothesis was supported. The average time that it took the OTC drug, Motrin to dissolve was significantly higher than the others. The standard deviation of Motrin was also higher than the others. There were no discrepancies or outliers. Although it is better to have medicine that dissolve the fastest, some of them that take more time to dissolve may last longer in one's system because of slower release. The amount of food you've eaten can also have an impact of how fast the pill dissolves, but some meds require food with it, so please take as recommended. The benefit of having a caplet is that it is easier to swallow (the coating makes it smoother) for some patients, and that coating they have helps prevent stomach acid from destroying the medicine.

318-05 Does chewing gum affect a person's math scores

Darryl Robinson

(Roehrich – Behavior)

Sometimes when I take a test or quiz the teacher proctoring it states this one rule, 'No eating food'. When he or she says food it consists of candy, snacks, and even gum. They do not want the students to chew gum specifically because they may smack it, blow bubbles leading to a pop sound, or put there flavorless gum in places where other people can find it. What if chewing gum during a quiz or test was not so bad after all? What if chewing gum allowed the student taking their quiz or test, to get higher grades than not having anything to chew on at all? I investigated this by buying five packs of Trident gum consisting of various flavors. I then created six quizzes which were made up of forty arithmetic problems. With the ten people I chose to quiz, the first quiz I gave to them I did not give them gum as a control. The remaining five quizzes I gave to them on the consecutive days that followed, with a different flavor of Trident gum for each day. When the quiz was given they had a minute to complete it which caused them to be under pressure, and not get perfect scores on each one since they did not have a long amount of time to complete it. After the ten people took all the six quizzes, the results showed that gum after all increased their scores versus the control quiz with no gum.

316-18 The effect of music on your memory

Esther Saychaleune

(Roehrich – Behavior)

My project is the effect of music on your memory. I was trying to see if listening to different type of genre music would effect a person's memorization. I took 10 people and had tested them with no music, then pop music, then classical music, then country music, and then R&B music. For each time I tested a person with a different type of genre they had a list to memorize for 4 minutes and then after 4 minutes had passed they had to write down as much words as they memorized from the list. Some people's memorization was better while different type of genre music was playing. Some other people had got distracted easily and wasn't able to focus. Music distracts people from focusing on a simple task.

314-17 Which disinfectant works the best?

Ciarrah Silva

(Ross – Products)

The purpose of this experiment is to test which product works better at killing bacteria? The products being used are Clorox, Seventh Generation, Fantastik, and Lysol. All of these products claim to kill 99.9% of bacteria, and all the products will be tested to see which really works the best. The products will be tested on computer mice as multiple people use the computer mice everyday for long periods of time. There are many bacteria that can be found on the surface of the mouse such as E. coli (Escherichia coli), Staphylococcus aureus and micrococcus. These are bacteria that can cause sicknesses. To test each product equally I spilt the computer mouse into four equal parts. Then using paper towel, I sprayed two full sprays of each cleaner and wiped down each part of the mouse using a different cleaner on each. Then after 30 seconds I swabbed each part of the mouse using distilled water and sterilized cotton swabs and placed an equal amount of the cotton swab on the appropriate area of the agar plate labeled. Some of the results showed that there is no significant difference in the cleaning ability of each product as they killed approximately the same amount of bacteria.

318-16 Clean your bathroom right

Colleen Simon

(Ross – Products)

Are we cleaning our bathrooms right? This question has plagued many generations. How do we know if we're effectively killing the bacteria in our bathrooms? Serratia is a common bacteria found in bathrooms. Though not dangerous to people with healthy immune systems, those with compromised immune systems can suffer from urinary, wound or respiratory infections when in contact with it. To protect our weak ones, the first step is to make comfortable areas as clean as possible. Bleach, hand sanitizer, rubbing alcohol, antibacterial soap, and Lysol, common household cleaning agents, were used to determine the most effective way to disinfectant bathrooms. To determine this, 10 trials were completed for each product by using Serratia and several Petri dishes. Using tools to extract the bacteria from the nutrient broth, distribute it on the Petri dish, and placing the products onto the Petri dish, it was possible to determine which product was the most effective against serratia. After the bacteria was given time to grow overnight, their zone of inhibitions were measured. The product that produced the largest zone of inhibition was the most effective. These products were tested against the control, distilled water. The results were definitive, bleach produced the biggest zone of inhibition with its average being 50mm. Antibacterial soap was averaged around 30mm. Lysol's average zone of inhibition is 20mm. Hand sanitizer and rubbing alcohol averaged a zone of inhibition around 7mm. This means that the most effective cleaning agent against Serratia is bleach and the least effective includes water, rubbing alcohol, and hand sanitizer.

316-09 Triangles vs. Squares

Austin Siu

(Roehrich – Engineering)

This project is conducted to test whether triangular designs or rectangular designs are more efficient in buildings. The efficiency of the design is determined by its strength and stability. When triangles are placed together, they naturally form a truss design which would make triangular designs stronger than rectangular designs. Trusses are used to support places that have long span distances and places that receive heavy loads of weight. They are commonly found underneath and on the side of bridges to hold it up. Compared to triangles, squares are not as strong because they do not have braced angles which would cause it to collapse easier. However, they can be braced by creating a diagonal but this would be two triangles. In this experiment, ten buildings are created out of Popsicle sticks with identical structure to keep constant. Five of them are built with a triangular design while the other five have a rectangular design. These

buildings are tested to their limits by the addition of weights. A bucket is attached to the roof of the building and is hung below. Weights are slowly added to the bucket to apply pressure to the structures. The triangular design proved to be the stronger and more efficient than the rectangular design. This shows that triangular designs should not only be used in the creation of large skyscraper, but in every construction. Also, triangles are the stronger shape which is the reason why triangles can be found almost everywhere in life.

314-05 How many numbers can you remember?

Sayahi Suthakaran

(Sullivan – Behavior)

I conducted this experiment to test certain people's digit span, or in other words, the maximum number of digits that one can remember. To modify the experiment, I tested to see if age affects memorization. I tested people in various age groups. I had five main age groups, 5-10 year olds, 13-20, 21-30, 40-60, and 60-70 year olds. I came up with a hypothesis and at the end of the experiment, my hypothesis was correct and supported. I created a bar graph representing the difference in results for each age group. As the age increased, the amount of numbers memorized decreased. The most numbers memorized was by someone in their early 30s, from this information I can say that people in their 30s, have the best memory.

318-02 Hydrogen peroxide's effect on seed germination?

Gabrielle Tolchinsky

(Ross – Plants)

Hydrogen peroxide is used as a pesticide on many plants as they grow and on some crops after they harvest. It has been approved to be safe for use in these plants, with no effects on their growth. In my experiment, I wanted to test if hydrogen peroxide actually does have an effect on the germination of seeds. I think hydrogen peroxide will negatively affect the germination of radish seeds within a week of growth. In order to test this, I chose to use radish seeds as the plants. Radish seeds germinate fairly quickly, taking as little as three days. The experiment only lasted for seven days, because I wanted to see how quickly hydrogen peroxide affected the plants. The materials needed were a beaker, 80 radish seeds, four plastic Ziploc bags, tap water and 3% hydrogen peroxide. Within the first two days, the radish seeds in the control bag germinated. Only a few seeds in the bags with the hydrogen peroxide germinated. After the first three days, some of them died and no new ones germinated. However the ones in the control began to grow even more. It was clear that the hydrogen peroxide had a significantly negative effect on the germination of the seeds.

314-15 The effect of heat on the productivity of enzymes in fruits

Hannah Towfiek

(Sullivan – Biochemistry)

This experiment was performed to see whether or not heat would effect the productivity of the enzymes in pineapples and kiwis. The hypothesis made for this experiment inferred that an increase in heat would result in the fruits breaking the Jell-O down faster. I prepared the Jell-O and used fresh pineapple and kiwi as my controls. For the actual experiment, I boiled the fruits to certain temperatures and put them on the Jell-O to see how an increase in temperature effected the breakdown of the Jell-O. According to the results of the experiment, heat only increased the productivity of the enzyme to a certain extent. After a certain temperature the enzymes that were used became denatured and unable to further break down the Jell-O. Due to the result, the hypothesis made for this experiment was not fully supported.

319-21 Factors that affect water retention in soil

Judy Tso & Christine Ly

(Roehrich – Plants)

The purpose of this experiment is to investigate what factors will help reduce water usage when planting. Earth is made up of more than 71% of water but less than 1% of it is actually usable for our daily lives. (Perlman, 2014) Saving water not only helps the planet but it also lessens our monthly water bill. There will be two parts to this experiment. The first part of the experiment tests if oil contributes to a change in the rate of evaporation. Many farmers and gardeners have been using vegetable oil as an alternate pesticide, and it has been proven to work but it was uncertain if vegetable oil helped retain moisture. (Cranshaw, 2010). The type of oil used in the experiment includes, canola, olive and corn. The second part of the experiment will be testing how the diameter of the pot affects the rate of evaporation. The diameters (cm) of pots include 7(control), 14(big), 9(media) and 8(small). The diameter of the circle can ultimately hinder the occurrence of capillary action, movement of water within the spaces of a porous material due to adhesion, cohesion, and surface tension. As a result of this experiment, the addition of canola oil and the use of a relatively large diameter pot proved most effective in retaining the most moisture within the soil. In conclusion, canola oil lowers the rate of water evaporation, while a large diameter slows down the process of water escaping into the surface.

314-21 The effects of salinity on the hatching of an aquatic population

Amber Tucker

(Roehrich – Animals)

Environments in which organisms live in are constantly changed, equilibrium is constantly altered. For some organisms, it is easy for them to adapt to different living conditions. However, environmental changes can have a great effect on the reproduction of organisms. If the environment in which an organism lives in is not suitable, the amount of hatchings in the population will most likely decline. The purpose of my experiment is to test the effects of salinity on the hatching of an aquatic population. The subjects used for this experiment was brine shrimp and brine shrimp tend to thrive in salty environments. My hypothesis was that as the salinity increases to 4 teaspoons per half quart of water, the number of hatchings will increase. I created 5 different environments: the control had no salt, and the experimental groups had 1tsp., 2tsp., 3tsp., and 4tsp., of salt per half quart of water. These amounts were mixed into different containers. Then 40 brine shrimp eggs were placed in each container. The shrimp were given 48 hours to hatch under a light source. Afterwards, the containers were strained and the brine shrimp were counted. The most eggs hatched for 2tsp. of salt. The other experimental groups were significantly lower. Based on the data, my hypothesis was refuted. This experiment shows that the best living conditions were 2tsp. per half a quart of water. This shows that it's important to have a balanced environment for the success of the reproduction of the population of an organism.

320-15 Visual memory vs. Auditory memory

Gabriela Villagomez

(Roehrich – Behavior)

In this experiment, I tested people to see if they would have a better visual memory or auditory memory. My hypothesis was that my participants would have a better visual memory than auditory memory, because the things we see usually causes us to think, therefore our thinking is remembered as if it were heard. Thus visual information might actually get processed twice, once visually and another auditorily. For my experiment I had a total of 10 participants to take two memory tests (visual and auditory memory tests). First, I gathered 20 different number sequences for people to remember. To test someone's visual memory I showed them a set of numbers for 30 seconds and timed them with a timer. Then I had them recite the alphabet. Then I asked them what the numbers were, their score were the numbers they got right. To test someone's auditory

memory, I read them another sequence of numbers three times slowly. After that, I had them recite the alphabet. Then I asked them what the numbers were, their score were the numbers they got right. I did this 9 more times, for a total of 10 trials. My last step was to do a t- testing of my results. The t- value was 0.005121073. I concluded that my hypothesis was incorrect. The participants had similar results for visual and auditory memory. Therefore there was not a significant difference between the participants' visual memory and auditory memory.

320-05 Upset Stomach

Esther Viner

(Ross – Chemistry)

Acid indigestion is an uncomfortable illness that happens when you eat excess food or drink. It causes the stomach to secrete a high amount of hydrochloric acid (HCl). The quickest way to ease the pain is through an 'over-the-counter' antacid. That is a base used to neutralize the HCl. In this experiment, the efficiency of certain antacid brands is tested and compared. To do this, a simulation of an upset stomach would be created and an antacid will be added to that. The antacid will neutralize as much HCl as it can, then the rest will be neutralized through titration with sodium hydroxide (NaOH), another base. The concentrations of NaOH and HCl are the same; therefore the volume of NaOH needed to neutralize the remaining HCl after the antacid has already done its job, is equal to the volume of HCl not neutralized by the antacid. The antacid that neutralized the most HCl needs the least amount of NaOH to neutralize the rest of the acid solution. Since it needs the least amount of NaOH, it will be the most efficient one. While doing this experiment, I have found that the TUMS brand antacid is the best as it neutralized 14.580mL/g of HCl. Next the Rite-Aid brand neutralized 12.995mL/g of HCL. However, Rite-Aid brand's results are due to the fact that it's an 'Acid Neutralizer plus Antacid.' After that were Roloids which neutralized 9.477mL/g. Medifirst neutralized 7.995mL/g and Alka-Seltzer neutralized 3.245mL/g.

319-09 The effect of pills on the time it takes them to dissolve

Roy Wagner

(Ross – Products)

The researchers project addresses confusion with minor pain killers. Many in our world normally take minor pain relievers for pains such as body aches, fevers, or any headaches. This experiment was conducted to test different pain relievers, and simulate the amount of time it takes them to be effective in the human body. With this knowledge, people in the world who need pain relief quickly would understand the brands better. The researcher choose six different pills; ibuprofen IB tablets, ibuprofen modern pain medicine, Aleve, Advil, Bayer chewable aspirin, and rite aid acetaminophen. The researcher decided that all of these pills are minor pain relievers, and are used by many in every day life. The researchers methodology was fairly simple; for controls, the researchers simply placed six different brands of pills in 50 mL of water. The researcher then timed the amount of time it took for the pill to dissolve, and the inside of the pill was able to disperse throughout the water. This was done for 5 trials. Second, the actual experiment was done, the researcher did 10 trials, and instead of placing the six different brands of pills in water, the researcher placed the six different pills and 50 mL of HCl. In this experiment, the water is a control. This is a result that the researcher can look at for help, this also allowed the researchers to establish trends in the experiment. The researcher used about 1000 mL of hydrochloric acid, six beakers, 15 pills of each of the 6 brands, around 250 mL of water, and a stopwatch to record the time. After the experiment was done, it was concluded that Bayer was the quickest reacting painkiller, followed by; Ibuprofen IB, Ibuprofen MPM, rite aid acetaminophen, and lastly by Advil. In conclusion, it can be deducted that the quickest acting pain reliever is the chewable Bayer Aspirin. This however does not support any other factors, such as strength, or price. This might help people in the world; if they are in need of quick pain relief and they see these six brands of pain

relievers in a store, they might think of this project and take Bayer in hopes of quick pain relief.

319-12 pH level and its effect on plant growth and appearance

Bismah Warraich

(Roehrich – Chemistry)

The experiment I did was to see how increasing the pH level of soil in a plant would affect plant growth and the physical appearance. pH basically shows how much acid or base is in the soil. On the universal pH scale, 7.0 is neutral meaning the concentration of H^+/H_3O^+ and OH^- is equal. When pH level is below 7.0, the substance is an acid and contains more H^+/H_3O^+ than OH^- . When pH level is above 7.0, the substance is a base and contains more OH^- than H^+/H_3O^+ . My hypothesis is that if the experimental group is sprayed with a base solution in this case Windex, then it will grow faster and healthier than the control group. For this experiment, four plants were needed, two for the control group and two for the experimental group. The experimental group was sprayed with Windex five times on a daily basis for a total of ten days. Many things were kept constant such as sunlight, space, and water. The plants were measured on the first day, fifth day, and the tenth day. My hypothesis was actually incorrect. Spraying the plants did not increase the growth. Increasing the concentration of OH^- and decreasing the concentration of H^+/H_3O^+ in the soil did not positively impact the plants. One of the experimental plants died which also indicates that increasing the pH level of the soil is not good.

319-04 The effect of fruit juice on E. coli

Xiu Ling Weng

(Sullivan – Microbiology)

The purpose of this experiment was to determine whether the cranberry cocktail, the apple juice or the orange juice had the most effect against the bacteria that grows inside of everyone's intestines, which is Escherichia coli or E. coli. Each agar plate used is separated into four labeled sections with three being the independent variables and one being the control, using the distilled water. They are then spread evenly across with the E. coli and plain paper discs are used to dip into each juice, and the distilled water to later create a zone of inhibition. After incubating the plates overnight at 37 °C, each zone of inhibition would be measured and recorded. As a result, the orange juice had no zones at all and the apple juice had a inconsistent data showing that it only affected E. coli sometimes. Cranberry cocktail proved to be the one that is the most effective against E. coli with a consistent data.

316-21 Vegetable vs. Meat. Which is easier?

Candice West

(Roehrich – Microbiology)

My projects purpose is to see which food E. coli grows best on. E. coli is a bacteria found in the lower intestines of mammals. They help the mammal break down it food and in return the mammal lets it grow their. Now mammals do expel some of the E. coli when there is too much of it through excretion. I hypothesize that the vegetable agar will be easier to grow on because when animals (including mammals) eat plant they have tons of energy will meat eaters genially sleep to save energy. To test my idea I made my own agar out of Progresso chicken noodle soup and vegetable soup. I will let the bacteria grow for two days and count the number of colonies grew.

316-13 The effect of fat percentage on protein yield in dairy milk

Man I Wu

(Roehrich – Products)

The purpose of this experiment is to observe the effect of fat percentage on the amount of protein, casein, in dairy milk. Casein makes up eighty percent of the protein in dairy

milk, and is sold as one of the most popular protein powders. This is because it takes a longer time to absorb, leading to a greater amount of the protein circulating through the body and allowing for a greater absorbance. The hypothesis of this experiment is whole milk will garner the greatest amount of casein since it has gone through the least processing to remove fat. The control for this experiment is 2% fat milk, since it is recommended that all but infants should consume it. Each type of milk has a total of 4 trials each, where the milk is heated to 38 °C and vinegar is then added to cause the protein to denature, therefore changing its shape due to the lowered pH and precipitating. The data shows that 2% milk has the greatest amount of protein and it can be stated with 90% confidence that the results were not due to chance. Therefore, the hypothesis was refuted by the evidence, as whole milk did not have the most casein. If this experiment was repeated, then there should be a greater number of trials and all of the water should be allowed to evaporate to gain the most accurate measurement of casein.

314-12 The effect of concentration on the refractive index

William Xie

(Roehrich – Physics)

The purpose of this experiment is to measure the refractive index of gelatin of various concentrations. Using Snell's law, one is able to determine the average velocity of a light beam. In this experiment, a laser pointer will be fired through air and gelatin. The angle of incidence and angle of refraction will be measured to determine the angle of incidence. Snell's law states that the sine of the angle of incidence divided by the sine of the angle of refraction is in proportion to their refractive indices, which determines the amount of light bent and slowed down. Therefore, using basic materials such as a laser pointer, protractor, and gelatin, one can find an estimated refractive index of gelatin. In addition to finding the refractive index of unsugared gelatin, the amount of sugar added will be manipulated to test how the concentration of the gelatin will affect the refractive index. The percent composition of sugar will also be calculated to determine what how much of the gelatin solution is sugar and how the increased concentration will change the refractive index. My hypothesis was that as concentration increases, the refractive index will also increase because the added sugar molecules are slightly disturbing the trajectory of the light beam. The experimental results supported my hypothesis that increased concentration also increases the refractive index.

318-18 Effect of UV light on various bottle opacities containing E. coli

Lily Xiong

(Sullivan – Microbiology)

The purpose of the experiment was to determine the relationship between the disinfection of drinking water (infused with bacteria) and the opacity of a container. PET bottles were filled with tap water and E. coli and then exposed to UV light for disinfection. Before and after exposure to UV light was compared for the results. The after 0% opacity bottle had more bacteria disinfected than the after 100% opacity bottle. Therefore, for the SODIS method to be effective, the bottle used must be fully transparent.

318-17 Which contains the most vitamin C?

Lisa Zhu & Yating Wang

(Roehrich – Chemistry)

The experiment was to test which of the five different types of fruits and the five different types of juice products had the most amount of Vitamin C. To test this experiment, fill a flask with 1/4 cup of starch solution indicator. The starch indicator is a mixture of water, starch and eight drops of iodine. Then place it under a burette that is connected to the ring stand. Fill the burette with the juice that is being tested. Release one milliliter of the juice into the flask, for every milliliter stop the burette and stir the flask. Continue the procedure until the starch indicator solution is clear or no longer

blue. Repeat this step three more times for each juice product and fresh fruit. Some source of errors that may affect the result can be the amount of starch solution and iodine added to create the starch solution indicator. As well as the correct measurements of the juices that was added into the iodine solution indicator. Some improvements that could be preformed were to check for the exact measurement of iodine and starch solution. Also, make sure each drop is exactly one milliliter for every fresh juice (squeezed) or juice products that are added to the flask containing the starch solution indicator. Mango, orange and Luzona (mango juice product) contained the most Vitamin C compared to the Vitamin C tablet. The t-test showed less than 90% level of confidence. This means that the hypothesis could not be supported.

Room Arrangements

A314, A316, A318, A320

A319 (Chemistry Lab)

