CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Shareen N. Ashby

Project Number

J1701

Project Title

Don't Get Sick

Abstract

Objectives/Goals

I wanted to determine what was the best method of removing bacteria from fruit.

Methods/Materials

In my experiment I tested which method of washing apples removed the most bacteria. The methods I tested were friction (by rubbing it), by rinsing them with water, and by washing them with soap and water.

Results

In the end causing friction, which is rubbing the apples with a paper towel, got rid of most of the bacteria. And then washing apples with soap and water got rid of a little bacteria, and rinsing the apples with water made the bacteria grow more.

Conclusions/Discussion

Friction worked the most because when you rub the apples you are loosening the bacteria and removing it, But when you use soap and water you are not rubbing it, you are loosening it with soap but you're not rubbing it so it doesn't come off. Rinsing the apples with water added bacteria because there could have bacteria in the it already and because there is nothing actually loosening the bacteria, or taking it off.

Summary Statement

My project is about testing which method of washing apples removes the most bacteria.

Help Received

My mom helped me design the bord and my brother bought the agar.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Elizabeth A. Bellingham; Hannah J. Gordon

Project Number

J1702

Project Title

Drinking Bugs: Are Opened Water Bottles Safe?

Abstract

Objectives/Goals

Our Object was to determine the amount of microbial growth in an opened water bottle over a period of time. After testing a number of water bottles, we believed that the microbial growth would continuously increase in a water bottle starting at our control bottle to our E- 8 or experiment 8.

Methods/Materials

We gathered nine water bottles and labeled them C(for Control) and E- 1 through E- 8. We intentionally did not open the C bottle. On the first day we opened E- 1 and did not take a sip. On the second day we took a sip out of E- 2. On day three we took a sip out of E- 3. On day four we took a sip from E- 4 and so on to E- 8. Also on day eight we took a swab with a sterilized cotton tip from the inside lip of every water bottle and streaked each swab on separate agar- filled Petri dishes. We allowed the microbial growth to develop in an incubator for five days. At that time we collected samples and stained them for morphological identification (size, shape and color staining characteristics). Additionally, we also collected culture swaps for laboratory submission and identification.

Results

Our data indicates that our hypothesis was incorrect. It is not safe to drink from a used water bottle. Even after one day, we found colonies within the Agar filled Petri dishes. We grew the following bacteria from the water bottles: Staphylococcus spp., Streptococcus spp., Corynebacterium spp., and Moraxella spp.

Conclusions/Discussion

We grew four types of bacteria from the opened water bottles. These bacteria can be found in the mouth or on skin and may cause clinical disease. By drinking an opened water bottle over a period of time humans become susceptible to food poisoning with symptoms of vomiting and diarrhea. These bacteria are known to cause heart disease, whooping cough, and bronchitis. Our conclusion is that bacteria grow in water bottles over a period of time, and that the bacteria can be harmful.

Summary Statement

Our Experiment is determining if bacteria grow in opened water bottles over a span of time.

Help Received

Our parents bought materials, drove us to locations such as a pharmacy for experimenting, the supermarket for water bottles, and oversaw our experimenting. We were instructed on techniques with plating, swabbing, staining, and looking through a microscope. We then accomplished the experimenting

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Arjun D. Boddu

Project Number

J1703

Project Title

Everyday Substances in a Fight against Bacteria

Abstract

Objectives/Goals

My project tests the antibacterial effect of common household substances such as vinegar, garlic, ginger, and a mixture of honey and lemon juice by studying their effect on the growth of Staphylococcus Epidermis.

Methods/Materials

Obtained Staphylococcus Epidermis from human skin and cultured on blood agar plates. Five blood agar plates were inoculated with Staphylococcus Epidermis and measured amounts of common household substances were applied. Incubated blood agar plates for three days and then removed and placed at room temperature for 24 hours. Measured diameter of no-growth zone of each plate. Safely disposed of all material in bio-hazard trash.

Results

Vinegar had the strongest antibacterial effect against Staphylococcus Epidermis with an average of 7.6 mm of no-growth zone. The mixture of honey and lemon had the second strongest antibacterial effect with an average of 6.8 mm of no-growth zone. Garlic juice and ginger respectively had no-growth zones with an average of 2.5 mm in two out of five plates. The other three plates had overgrowth caused by either foreign bacteria or fungi.

Conclusions/Discussion

In conclusion, the data I gathered proved that all the substances I used in the experiment had an antibacterial effect on Staphylococcus Epidermis in varying degrees. The substance with the greatest antibacterial effect was vinegar. The substance with the second greatest effect was honey and lemon juice mixed together. Garlic and ginger had inconsistent antibacterial effects.

Summary Statement

My project tests the antibacterial effects of common household substances.

Help Received

Father helped with board; Mother proof-read report; Used microbiology lab and apparatus at South Coast Medical Center under the supervision of Dr. Miyamoto

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Kayla L. Bozer

Project Number

J1704

Project Title

Don't Put That in Your Mouth!

Abstract

Objectives/Goals

Does the method of storage affect the amount of bacteria that will grow on your retainer during a twelve hour period.

Methods/Materials

Retainer, Incubator, Petri Dishes, Blood Agars, Clear Tape, Black Sharpie, Q-tips, Latex Gloves, Stop Watch, Safety Goggles, Open container, Retainer Case, Distilled Water, Baking Soda, Listerine.
1. obtain materials listed above 2.Place retainer in mouth before falling asleep and record time 3. remove retainer from mouth exactly twelve hours later 4. Swab one square centimeter of the retainer as a control and streak a petri dish 5. Place the retainer in an open container and record time 6. remove retainer from the container twelve hours later, and swab a seperate one square centimeter 7. Inoculate the petri dish with a Q-tip 8. Place the petri dish in an incubator for twenty four hours, remove and analysis 9. Repeat steps 2-8 four more times for an open container 10. Repeat steps 2-9 for the other environments (closed container, distilled water, water with baking soda, and Listerine.

Results

My results gave me the knowledge that Listerine is the most affective way to kill bacteria. Listerine virtually eliminated all bacteria on the retainer, while with water, baking soda in water, a closed or open container bacteria would only slightly deminish if not grow.

Conclusions/Discussion

I was able to come to the conclusion that Listerine is the most affective way to store a retainer. I was able to accept my hypothesis and I was able to obtain all of my objectives. The information I gained from my experement is vital information for the everyday life of a teenager.

Summary Statement

To deterine the most affective way to store a retainer.

Help Received

My brother help with data table and graphs, Hemet Hospital for donating petri dishes, Hemet High School Science teachers; Mr. Kirkham, Mr. Skinner, and Mr. Brigham for helping me figure out how to test the bacteria. M. Truong the incubator. Toni Hunter for teaching me how to count bacterial colonies.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Jacki S. Edens

Project Number

J1705

Project Title

Sugar Rush

Abstract

Objectives/Goals

This project was designed to test if yeast colonies would grow faster with or without oxygen and with different sugars. Faster growth is important to the brewing process because it increases accuracy and speed. My hypothesis was that Sucrose with oxygen would promote the most yeast growth.

Methods/Materials

1. Oetker (Brand) Dry yeast (1 gram total). 2. MoreFlavor (Brand) Maltose (8 grams). 3. G&H (Brand) Sucrose (8 grams). 4. Now Foods (Brand) Fructose (8 grams). 5. Water (about 200 milliliters). 6. Incubator. 7. Ten 100 micro liter tubes with lids. 8. 200 micro liter pipette. 9. 1000 micro liter pipette. 10. Spectrophotometer. 11. 11 tubes fit for spectrophotometer (1 for clear water).

Spectrophotometer readings were measured using transmittancy. Transmittancy measures the amount of light that passes through the yeast solution. Less light is able to pass through with a higher density of proteins meaning there is more growth, when reading the data; a lower percentage is the measurement of greater growth. Clear water is 100% transmittance, because there are no proteins to stop the light.

Results

Maltose transmitted the least light, with 10% passing through without oxygen and 9% with oxygen. All sugars transmitted 13% of light without oxygen and 12% with oxygen. Fructose let had 93% transmittance with oxygen and 92% without oxygen. No Sugar transmitted 95% with oxygen and 92% without. Sucrose transmitted a lot of light with 98% transmittancy with oxygen and 93% with oxygen. Therefore Sugars (Maltose) with two units of glucose apposed to one grew faster.

Conclusions/Discussion

My hypothesis of sucrose growing the most with oxygen was not supported by the results. Sucrose with oxygen ended up growing the least out of all of the solutions. I thought sucrose, or white table sugar, would end up growing the most because it seemed like the best food source as it is processed differently using a raw sugar syrup and heavy syrup before it is dried. Sugar from fruit and barley are not processed in this way. Sucrose therefore seemed to offer more of a food source for this experiment.

Summary Statement

It is a project on the effect of sugar and oxygen on yeast growth

Help Received

Anne Marie Barnett helped pick out project; Ms. Hutton helped with testing.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Layla M. Elmi

Project Number

J1706

Project Title

Where Is the Bacteria?

Abstract

Objectives/Goals

Where are the bacteria? The purpose of this project is to figure out which part of the house has the most bacteria. Then, the results will help people know which part of the house needs to be sanitized more often to prevent sickness.

Methods/Materials

Samples were taken with cotton swabs from objects from the living room, kitchen, bathroom, bedroom, and computer room. The samples were then put into Petri dishes. The Petri dishes were then placed in an incubator for forty- eight hours at 370 C.

Results

The results were that the kitchen was the area with the most bacteria, then the bathroom, then the bedroom and living room. The area with the least bacteria is the computer room. The object in the kitchen with the most bacteria is the kitchen sponge. The object in the bathroom with the most bacteria is the toilet seat. The object in the bedroom with the most bacteria is the desk. The object in the living room with the most bacteria is the couch. The area in the computer room with the most bacteria is the keyboard.

Conclusions/Discussion

If the kitchen is sanitized more often, then sicknesses might diminish. To further this experiment, study of efficient ways to clean the kitchen.

Summary Statement

To determine which part of the house has the most bacteria.

Help Received

Used equipment from school. TSA plates purchased from Hardy Diagnostics.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Eli W. Erlick

Project Number

J1707

Project Title

Staphylococcus aureus: Resistance to Silver-Impregnated Materials

Abstract

Objectives/Goals

The objective of this project was to see if Staphylococcus aureus could develop resistance to a silver-impregnated catheter. Silver containing polymers are being increasingly used in products to decrease human exposure to infectious bacteria. There is little data on the development of resistance of Staphylococcus aureus to silver impregnated polymers.

Methods/Materials

A solution containing Staphylococcus aureus was placed into two test tubes containing thioglycollate solution and thioglycollate solution that contained .5 cm of silver catheter. Those two solutions were incubated, and plated. Digital pictures of the solutions were taken and imported into Adobe Photoshop to calculate percent plate coverage. Both solutions were then placed into test tubes containing thioglycollate solution and were allowed to culture. Each Staphylococcus aureus solution was then placed into both a test tube containing thioglycollate solution and a test tube containing thioglycollate solution and .5 cm of silver catheter. These solutions were allowed to incubate for 3 hours and were then plated and the percent plate coverage was calculated. This procedure was repeated for a total of three trials.

Results

The Staphylococcus aureus which had a prior exposure to the silver-impregnated catheter had less suppression of growth on a second exposure to the silver catheter than the Staphylococcus aureus which had not been previously exposed.

Conclusions/Discussion

Based on my results, it appears that there is a mechanism of resistance that can develop in Staphylococcus aureus to a silver-impregnated polymer.

Summary Statement

Staphylococcus aureus# ability to resist the effects of silver-impregnated catheter was tested, and it was found that Staphylococcus aureus developed a resistance to the anti-bacterial effects of this product.

Help Received

Ms. Judy Ferleman, Bacteriologist at Howard Memorial Hospital, helped me obtain coagulase-positive Staphylococcus aureus. Dr. Carla Longchamp helped me obtain materials and reviewed biohazard precautions in regards to my use of this bacteria. She also helped me dispose of the biohazardous

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Carley R. Gilson

Project Number

J1708

Project Title

Boys vs. Girls: Who Is Dirtier?

Abstract

Objectives/Goals

My objective was to find out who had more bacteria on their hands sixth grade boys or sixth grade girls.

Methods/Materials

I chose fourteen 6th grade boys and fourteen 6th grade girls to test how much bacteria was on their hands. My first step was getting sterile swabs and spraying distilled water over the swab and then wiping the students index finger on their left hand. Then I inoculated the sterile petri dishes with the agar in it, for each students finger I swabbed. Then I quickly closed the lid to each petri dish so that no extra bacteria would be trapped inside. I did this for each student. Finally I observed and documented with photos the bacterial growth on the individual petri dishes for seven days.

Results

After seven days of growing bacteria, the ending result was that the petri dishes for the boys grew in twelve dishes and in the girls it was only eleven. Out of fourteen boys eighty-six percent grew bacteria and out of fourteen girls seventy-nine percent grew bacteria.

Conclusions/Discussion

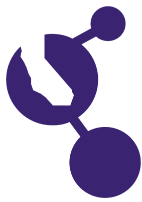
The conclusion to my experiment proves the sixth grade boys had more bacteria on their hands than the sixth grade girls. The number of petri dishes for the boys that grew bacteria was greater that the petri dishes of the girls. My experiment proved that sixth grade boys are dirtier than sixth grade girls.

Summary Statement

My experiment was to find out who had more bacteria on their hands sixth grade boys or sixth grade girls.

Help Received

My teacher helped with the idea, my mom helped with the board, and my sister downloaded the photos.



CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Aarin B. Henning

Project Number

J1709

Project Title

Bacterial Levels in Ocean Water

Abstract

Objectives/Goals

My purpose of doing this science fair project is to see what ocean water, out of Manhattan, Hermosa, and Redondo Beaches, has the highest levels of bacteria, so I am conscious of it.

Methods/Materials

9 Petri dishes, Cotton Swabs, Gloves, 3 Small glass containers, logbook, Permanent markers, Plastic bags, Pen

Results

In my experiment, my results differed from my hypothesis. In Petri dish one, Manhattan Beach had the most bacteria present, with 40 colonies, followed by Hermosa Beach, 31 colonies, and eventually Redondo Beach, with 18 colonies of bacteria. In Petri dish two, Redondo Beach had the most colonies of bacteria, with 61 colonies, though it had the most, the colonies were rather small compared to the other beaches. Manhattan Beach had the next most, 54 colonies, and finally Hermosa, with 44 colonies of bacteria. In the last Petri dish, Manhattan Beach had the most, by far. Manhattan had 78 colonies, while Redondo had 33, and Hermosa had 22 colonies of bacteria.

On average, Manhattan Beach had the highest amount, 57 colonies, Redondo was next with 37 colonies, and Hermosa came in a close third with 32 colonies of bacteria. Although Redondo had the next highest amount of bacteria compared to Manhattan Beach, it took about a day longer to grow than the other two beaches, and Manhattan clearly began growing first in all Petri dishes.

Conclusions/Discussion

I thought that Redondo Beach's water would be the most polluted, because it has the largest population, therefore more waste, and more bacteria. Unfortunately, I was wrong. I tested at Manhattan, Hermosa, and Redondo Beaches, which all had an A+ grade (Healthebay.com). Manhattan Beach had the most bacteria according to my results. As healthebay.com shows, water quality differs in other areas, depending on the conditions; for instance, El Segundo's beach is generally very polluted, and often closes due to so much waste from the refinery. Humans can also have an effect on the water quality, due to the bacteria given off from their bodies when swimming in the water (Hill, Valerie 2009). Therefore, my results make sense because, Manhattan Beach's bacteria began growing before the other beaches, and it is closer to the refinery in El Segundo. The overall results proved my hypothesis wrong, even though this happened, my project ran fairly smoothly, and I was happy with my results.

Summary Statement

My project compares the bacterial levels in the ocean water in Manhattan, Hermosa, and Redondo Beaches.

Help Received

My family members helped collect ocean water samples, so the samples would be taken at the exact same time.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Judd C. Howard

Project Number

J1710

Project Title

Pool vs. Jacuzzi: A Study of Bacteria Levels in Water

Abstract

Objectives/Goals

My hypothesis is that Jacuzzi water is dirtier than swimming pool water and bacteria can grow better in small warm environments. Because Jacuzzis are smaller bodies of water and warmer than swimming pools, I hypothesize that the numbers and concentration of bacteria will be higher.

Methods/Materials

1-22 x 28 inch poster board;37 adhesive labels;33 Nutrient agar plates;8 quart size Ziploc baggies;1 digital thermometer;1 digital camera;32 sterile cotton swabs;1 roll scotch tape; Journal to record experiment/observations.

Procedures

1. Purchased materials. 2. Identified locations of test sites. 3. Labeled poster board with 8 columns as follows: Pool A, Jacuzzi A; Pool B, Jacuzzi B; Pool C, Jacuzzi C; Pool D, Jacuzzi D. 4. Pre-labeled 8 Ziploc baggies with Pool A, Jacuzzi A, etc. 5. Took temperature of pool and Jacuzzi and tested water pH level for all sites and recorded temperature and pH level on individual labels on each bag. 6. Collected 1 water sample from pool and 1 water sample from Jacuzzi at each location. 7. Took samples home and swabbed 4 agar dishes per water sample with cotton swabs. 8. Taped shut and put label on each dish (4 samples each location). 9. Opened and closed one agar dish for control sample. 10. Set up test on poster board to observe daily. 11. Made observations, counted and recorded bacteria growth near 8pm daily. 12. Came up with method of counting agar plates with large amounts of growth by using a sharpie pen to mark growth. 13. Took photos and wrote notes daily on number of bacteria growing per day. 14. Drew conclusions from outcome of experiment.

Results

The data and results show that two of the test sites supported my hypothesis, that Jacuzzi's have more bacteria than pools, and two did not.

Conclusions/Discussion

I predicted that Jacuzzis would grow more bacteria than pools. This was my theory because some bacteria grow better in warm environments. Because Jacuzzis are smaller and warmer than pools, the number and concentration of bacteria should be higher. My background research stated that temperature and pH level affected bacteria growth. The data and results show that two of the test sites supported my hypothesis. The temperature of a body of water does not predict the number of bacteria that are present in them. Some factors that would contribute to bacteria growth in pools and Jacuzzi's are the pH level, the maintenance schedule and usage.

Summary Statement

My project is a study of bacteria in bodies of water and whether there are more bacteria growing in swimming pools or Jacuzzi's.

Help Received

My mom helped me format the report and glue my display board

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Katherine N. Kurz

Project Number

J1711

Project Title

How Does Breast Milk Location Affect Bacteria Formation?

Abstract

Objectives/Goals

This project researches under which conditions bacterial growth in milk is strongest, and what the rate of growth is. I am doing this project so that I could find out how long milk can be stored and where is the best place to keep it. Many mothers need to know how long they can keep their breast milk before it goes bad, and they can#t feed it to their babies.

Methods/Materials

I used fresh breast milk, and left a sample at room temperature, and the others in the refrigerator and freezer. I tested the milk, in fixed time intervals, for bacteria. I also used formula as reference.

Results

The test showed a higher bacteria count for the milk stored frozen than the milk stored just cold, both initially as well as after 30 minutes and two hours. The colder the milk was kept, the lower the bacteria count was.For fresh milk, left at room temperature, the bacteria count increased initially, but unexpectedly dropped after 2 hours, and grew again after 3 hours. The milk left on the counter showed the most bacterial growth. For milk left on the counter for 2, 4 and 6 hours, the bacteria count grew for the first two hours, and then reduced irregularly thereafter.

Conclusions/Discussion

I was able to proof that the colder you keep the breast milk, the less bacteria can grow. I was also able to show and reproduce the surprising fact that the bacteria count in breast milk at room temperature first grows, but then declines. This shows evidence that breast milk can protect itself to some extent from bacterial growth

Summary Statement

The project investigates bacterial growth in breast milk for different storage conditions, and indicates antibacterial properties of breast milk.

Help Received

Mrs. Marcarelli helped with general advice, Dr. Anna helped with the lab equipment, Mrs. Benson gave me a fresh supply of breast milk. Mr. Negas helped me figure out what to research when we needed to have all those pages of notes. I would like to thank are the other microbiology kids (from all Mrs.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Michaela J. Loomis

Project Number
J1712

Project Title
Ewww

Abstract

Objectives/Goals
I wanted to learn more about the role that different generations of cephalosporin type antibiotics play in killing or preventing the growth of bacterial pathogens in the human body. The focus was on which generation of cephalosporin type antibiotic killed the most staphoccocoulus bacteria. I expected Cephadroxil, the first generation of cephalosporins, to kill the most staphylococcus bacteria.

Methods/Materials
Sterile swabs were applied to my nasal passages to obtain the staphylococcus bacteria. To determine the decrease of staphylococcus bacteria, I measured the diameter, in millimeters, of the area surrounding the antibiotics that was free of bacterial growth.

Results
I can do several continuations of my experiment. One would be doing the experiment over a longer period of time by taking samples two days apart; also staining the bacteria to see which is gram positive and which is gram negative. As well as using the generic vs. named brand of the second generation of cephalosporin antibiotics.

Conclusions/Discussion
My over all conclusion was that Cefuroxime, not Cephadroxil, kills the most staphylococcus bacteria in 10 days. Over the course of the experiment I saw a decrease of bacterial growth in the Cefuroxime petri dish. Of the three generations of cephalosporin, that were tested Cefuroxime killed the most staph.
My test results can be beneficial to the scientific community because I confirmed that each generation of cephalosporin is different and they all kill different bacterial pathogens.

Summary Statement
The cause and effect relationship between different generations of Cephalosporin type antibiotis and staph bacteria though administering antibiotics to an established staph bacteria coloney and measuring the results over a 5 day time period

Help Received
used lab equipment at Amador Valley Medical Center, under the supervision of Jessica Kemprud, RN, MSN, FNP; Mrs. Heather Small mentored me; Mother drove me where I needed to go

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Olivia K. Maglieri

Project Number

J1713

Project Title

Investigating the Contamination Level on Coins Exposed to Various Environments

Abstract

Objectives/Goals

The purpose of my science fair project is to compare the effect of different environments on the contamination level of coins. The reason why I am doing this research is because if I see a coin lying on the ground, I usually pick it up. Most people think that finding a coin and picking it up is lucky but it could actually be very unlucky if the coin has harmful bacteria on it.

I will have a better understanding of which environment has the most contamination on coins.

Methods/Materials

I will take samples of lake water, grass from a park, and backyard soil. Sterilize coins with rubbing alcohol. Then I will place coins in the samples for 24 hours. Next 10 sterilized coins will be placed on a street heads side up for 24 hours. I will have ten students at an elementary school handle ten coins for 60 seconds each. Afterwards I will swab coins with sterilized Q-tips onto Petri dishes. Then I will observe bacteria growth. After 48 hours I count bacteria colonies. Then I will compare the bacteria count on a table. Lastly I will graph the results.

Results

I compared the data on a table. The results will answer the question, which environment has more germs or bacteria. The coins tested in the lake water had the most bacteria. The results prove that picking up random coins found in these environments will leave the same bacteria on your hands.

Conclusions/Discussion

After completing my investigation on the contamination level on different environments, I found that the coins tested in the lake environment had the most bacteria. I found that my hypothesis was incorrect. My hypothesis stated that the students hands would have the most bacteria. The lest amount of bacteria was found on the coins tested in the street environment.

The lake had an average of 964 bacteria colonies and the park had an average of 912 bacteria colonies. The backyard sample had an average of 300 bacteria colonies. The least amount of bacteria was found on the coins tested in the street and the coins tested from students hands.

In conclusion picking up a coin from a street has less bacteria than a coin found near or in a lake environment.

Summary Statement

My project is about determining which environment contains the most bacteria.

Help Received

Mother helped type and sister helped cut paper for board.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Alexandra Maloof

Project Number

J1714

Project Title

Will Colloidal Silver Work as an Antibacterial?

Abstract

Objectives/Goals

The objective is to find out if colloidal silver would eliminate the bacteria colonies of Escherichia coli, Pseudomonas aeruginosa and Staphylococcus aureus.

Methods/Materials

In the initial colony tube, the organism was diluted to 0.5 McFarland standard using the turbidity meter. I used Staphylococcus aureus ATCC 29213, Escherichia coli ATCC 25922 and Pseudomonas aeruginosa ATCC 27853. The initial colony tube was diluted to 100µ added to 25ml of silver solution to subculture plates (BAP) at 0 hrs. of incubation, at 2 hrs. of incubation (at 36.8° 6%CO^2) and at 24 hrs (at 36.8° 6%CO^2). The amount of fluid used to inoculate plates was 100µ of organisms to the center of the plate, streaked in three different directions across the plates. I ended up with three plates used as my "Control" and three plates as my "Variable." Results were read at 0 hrs (full fields), 24 hrs and 48 hrs.

Results

The results of this experiment proved that colloidal silver has properties that disable the production and terminates the growth of bacteria. Escherichia coli colonies were killed after 2 hours of incubation, 24 hours readings. Pseudomonas aeruginosa and Staphylococcus aureus colonies were completely killed after 24 hours of incubation, 48 hours readings.

Conclusions/Discussion

This project had an exciting outcome since colloidal silver is used only as a dietary supplement. In the future more research can be done so that it can be used as an antibiotic to kill fungi, viral and bacterial diseases. In addition to the benefits of colloidal silver, the cost would be very minimal since it could be made at home.

Summary Statement

This project proves that colloidal silver, used as a dietary supplement, is an effective antibacterial to kill Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli.

Help Received

Used lab equipment at El Centro Regional Medical Hospital under the supervision of Magda Rumbout-Clinical Lab Scientist.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Jamie Kerby; Priscilla Mauck

Project Number

J1715

Project Title

Moldy Madness

Abstract

Methods/Materials

we used the following materials:
3 IGA brand wheat bread slices, 3 Velveeta cheese slices, 2 thermometers,4 napkins, 6 ziploc bags, freezer, rerigerator, countor top

Results

the Freezer got litlle mold
Refrigerator got medium amount of mold
Room Temperature one got the most mold.

Conclusions/Discussion

Yes,temperature affects mold rrowth. We saw how much the mold grew at differnet at the sane time. It took forever for the mold to start growinhg and it was disgusting looking at the roon temperature mold. Every article said mold grows best at that humans prefer. We weren't supsised at what we saw. At furst, the mold on the cheese wouldn't grow because it was too dry. Once the mold started to grow, the warmer temperature really helped the mold to grow. We wouldn'd change anything that we did.

Summary Statement

how different temperatures affect mold growth

Help Received

Mother helped type report

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Sonya A. Mital

Project Number

J1716

Project Title

Got Turmeric? The Magic Spice! Investigating the Anti-Bacterial Properties of Turmeric on the Shelf Life of Milk

Abstract

Objectives/Goals

To determine if turmeric has anti-bacterial properties that can preserve milk? If so, what is the optimum turmeric level required?

Methods/Materials

MATERIALS: 72 test tubes (10ml), turmeric powder, milk, test tube racks (6), Methylene Blue, graduated cylinder (10ml), electronic scale (0.1g-100g), calibration weight, liquid dropper

PROCEDURE:

A. Boil test tubes to sterilize. Calibrate scale using calibration weight. Weigh turmeric qtys. into test tubes creating turmeric milk solutions of varying concentrations (.1-.8g turmeric in 5-8ml of milk).

B. Perform Methylene Blue Test: Add a drop of Meth. Blue to each test tube. Measure the time taken for the contents of each test tube to turn white which happens when the contents have spoiled.

C. Repeat step B, 6 times for a total of 36 test tubes.

D. Follow-up test to determine optimal qty. of turmeric. Create more dilute solutions (.1g turmeric in 50-200ml milk) in sterilized cups. Note which cup that takes the longest to spoil compared to plain milk based on Meth. Blue Test.

Results

A. Test tubes with turmeric took an average of 7 to 15 hours longer (depending on the qty of turmeric) to turn white in Meth. Blue Test compared to test tubes with plain milk.

B. Test tubes holding more turmeric took longer to change color than test tubes with less turmeric.

C. In the follow-up experiment, the concentration that was effective was 0.1g/50ml. At this level turmeric milk lasted 9 hrs longer than plain milk. Taste and color of turmeric were negligible and only detected on careful examination. More dilute levels (0.1g/100ml and 0.1g/200ml) showed behavior closer to plain (control) milk.

Conclusions/Discussion

My hypothesis was supported. Turmeric slowed the growth of bacteria that spoil milk. I observed that higher concentrations lasted longer than lower. This discovery is relevant in underdeveloped countries where many cannot afford refrigerators (according to WHO about 50% of world population lacks refrigeration). A pinch of turmeric can slow their milk from spoiling for an additional 9 hrs. It would also be easier for small dairy farmers and other producers to keep milk from spoiling before it reaches market. One caveat is turmeric imparts a mild taste and yellowish tint that some may not like. Even at the lowest effective turmeric level the light yellow tint of turmeric was visible while taste was harder to detect.

Summary Statement

Investigate if the anti-bacterial properties of turmeric can extend the shelf life of milk & its potential to benefit underdeveloped countries lacking refrigeration.

Help Received

Father helped with Excel;mother with board.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Tyler J. Newcomb

Project Number

J1717

Project Title

The Carotene Cure?

Abstract

Objectives/Goals

The objective of my project is to see whether Vitamin A / Beta-Carotene will have any effect on the growth of Agrobacterium Tumefaciens (cancer) in plants.

Methods/Materials

I used nine of the same type of plants, 9 pots soil, water, beta-carotene liquid pills, 3 sterilized needles, bleach, latex gloves, ruler, paper, pencil, vial of Agrobacterium Tumefaciens, 6 popsicle sticks, 6 toothpicks and one measuring cup. After making a slit with a toothpick on 6 of the plants, with a popsicle stick I took roughly the same amount of Agrobacterium Tumefaciens from the vial it came in and placed it in the slit in the stem of the plants and then watered all 9 regularly but 3 of them got injections of beta-carotene every other day.

Results

The beta-carotene had no effect on stopping the growth of the Agrobacterium Tumefaciens in the plants and the beta-carotene even stopped growth of leaves where it was injected.

Conclusions/Discussion

My conclusion is that beta-carotene/vitamin A does not stop cancer (Agrobacterium Tumefaciens) in plants like I predicted. Studies have shown that it is better to get our vitamin sources from the food we eat than from supplements and too many supplements can actually be harmful to our bodies. Our moms were right...we need to eat our veggies.

Summary Statement

My project is about whether using vitamin A can stop a carcinogen's growth in plants.

Help Received

Desert Hematology Oncology for supplies; Science Teacher helping obtain plant carcinogen

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Natalie Ng

Project Number

J1718

Project Title

Optimizing Bacterial Transformation Efficiency: A Study of Heat and Cold Shock Parameters and DNA Plasmid Concentration

Abstract

Objectives/Goals

Bacterial transformation is widely used in commercial applications and research laboratories as a way to introduce or transfer one or more new genes into a cell. My project aimed to investigate how different heat and cold shock parameters and DNA plasmid concentration affect the transformation efficiency of bacteria in a two-step chemical transformation protocol. I hypothesized that longer the heat shock and cold shock duration at the recommended temperature with the recommended DNA concentration should result in the highest transformation efficiency.

Methods/Materials

My control was the experiment at the recommended (nominal) condition (42C heat shock temperature, 50 second heat shock duration, 2 minute cold shock duration, 1X DNA plasmid concentration). I varied the following parameters: heat shock temperature, heat shock duration, cold shock duration, and DNA plasmid concentration. Experiments were conducted such that only one parameter varied at a time, while keeping other parameters at nominal values. I used Bio-RadOs pGLO plasmid, which consists of three genes: a Green Fluorescent Protein (GFP), ampicillin resistance, and an ara operon gene. I used Escherichia coli HB 101 K-12, a non-pathogenic, gram-negative bacterium.

Results

Amongst the cold shock durations tested, 30 minutes produced the best results, 975 transformants/µg. For the heat shock temperatures tested, 37C was optimal, 294 transformants/µg. Amongst the heat shock durations tested, both 25 and 50 seconds yielded the highest transformation efficiency, 84 transformants/µg. For the DNA plasmid concentration, both 0.1X and 0.01X concentration yielded 625 transformants/µg.

Conclusions/Discussion

The 25 or 50 second heat shock duration was optimal because it allowed enough time for the cells to become susceptible to the plasmid DNA, and not damaged by the heat. The 30 minute cold shock duration was the best because it gave the cells sufficient time to repair after the heat shock. I think that 37C produced the highest transformation efficiency because there was a good probability of cells undergoing transformation as these cells were not damaged by an elevated temperature. For the DNA plasmid concentrations, I concluded that the saturation point of the DNA plasmid lied within 0.1X and 1X, since the transformation efficiency remained constant for concentrations below 0.1X and decreased for concentrations above 0.1X.

Summary Statement

This project aimed to investigate how different key parameters in a two-step chemical transformation protocol affected the transformation efficiency of bacteria.

Help Received

I used lab equipment at Stanford University under the supervision of Prof. Allan Campbell; Prof. C. Ouverney (SJSU) guided me on Epi-fluorescent microscope; Prof. I. Gabashvili (SJSU) introduced me to Blastx; Prof. C. Hackworth (West Valley College) advised me on experimental parameters.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Maariyah Patel

Project Number

J1719

Project Title

The Sweet Truth: The Effects of Sucrose and Xylitol on the Growth of Streptococcus mutans

Abstract

Objectives/Goals

The purpose of my project was to determine the effects of sucrose and xylitol on the growth of Streptococcus mutans. I hypothesized that sucrose would potentiate the growth of Strep mutans; while xylitol would inhibit it. I also wanted to determine whether increasing the amounts of xylitol would further inhibit the growth of Strep mutans.

Methods/Materials

For each experiment, blood agar plates were streaked with diluted Strep mutans using a calibrated loop. Experiment 1- plates were labeled, control plates were set aside and respective mixtures of sucrose and xylitol poured onto their correctly labeled plates. Plates were left to dry. Experiment 2 - repeat of experiment 1 using only xylitol and in differing amounts. After inoculation, plates were incubated for 48 hours (for both experiments). Growth was recorded at 24 and 48 hours. Both experiments were repeated as trials 2 and 3 for accuracy.

Results

In all three trials, the blood agar plates with Strep mutans and sucrose were observed to have 4 + bacterial growth, at both 24 and 48 hours, compared to the control which had 3 + growth. On the other hand, the agar plates with Strep mutans and xylitol did not have the same results in all trials. In the first and third trial, the plates were observed to have 2 + growth at 24 hours and 3 + growth at 48 hours. In the second trial, the growth was observed as 2 + at 24 and 48 hours. With increasing amounts of xylitol, the growth of Strep mutans was inhibited significantly. The inhibitory effect of xylitol became most clear with 2.5 grams to 3 grams of xylitol. There was no growth observed in any plates with 3 grams of xylitol.

Conclusions/Discussion

Based on my research and results, I conclude that sucrose potentiates the growth of Streptococcus mutans. Sucrose is utilized by S. mutans to produce a sticky, extracellular polysaccharide that allows them to cohere to each other and multiply avidly. My results also prove that xylitol#s different chemical structure keeps it from being metabolized by Streptococcus mutans. This results in the accumulation of xylitol phosphate in the bacterial cells, resulting in growth inhibition Streptococcus mutans.

Summary Statement

I observed the effects of sucrose and xylitol on the growth of Streptococcus mutans, and determined that sucrose potentiates its growth, while xylitol inhibits it.

Help Received

I used the space at the LAC+USC Microbiology lab. Parents provided me guidance.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Chloe C. Peyton

Project Number

J1720

Project Title

Metals vs. Cleaning Agents

Abstract

Objectives/Goals

My objective was to determine which anti-microbials, metals or cleaning agents, are the most potent in killing bacteria grown in Petri dishes.

Methods/Materials

Cotton swabs were used to obtain household bacteria.18 Petri dishes with agar were used to grow bacteria and three were used as a control. I put a drop of Mr. Clean on three Petri dishes and did the same procedure for Lysol and Purell. For the metals I put a silver dime on the bacteria in three dishes. I did this again for Brass and Copper. Then after incubating the Petri dishes at 37 degrees Celsius for one and one half weeks, I checked them and measured the kill zone around the antimicrobial in centimeters.

Results

All metals but especially silver was the most potent anti-bacterial.It killed a diameter of 2 centimeters, 2.5 centimeters and 2 centimeters in the kill zones of the three trials. The silver and copper showed a greenish blue colored chemical reaction. I used a metal cookie tin with a lid and placed a heating pad on the top. The temperature of the incubator was held constant at 37 degrees Celsius as measured with a cooking thermometer. I stacked the Petri dishes and re-stacked them over several days to distribute the heat evenly.

Conclusions/Discussion

In my experiment, I discovered that silver is the best antimicrobial to kill household bacteria. Findings indicated that silver is the most potent killer of bacteria and based on my findings, my hypothesis was not correct. Metals, on average kill nearly twice the bacteria than cleaning agents used in this study. My findings support my observations that many buildings with high use by people have metal hand rails and door knobs. After conducting this experiment I now realize that the reason for the use of metals for hand railing and door knobs may be based on the antimicrobial properties of metals. I was also disappointed in the kill zones of the antimicrobial agents.

Summary Statement

I believe when antimicrobials are applied to bacteria grown in a Petri dish, the kill zone will be larger for antimicrobials than metals.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Vaishnavi L. Rao

Project Number

J1721

Project Title

Chasing Yeast in Yogurt

Abstract

Objectives/Goals

The objective of my experiment was to determine susceptibility of store brand and homemade yogurt to development of yeast contaminants. I hypothesized that commercial brand yogurts can develop yeasts > 10 CFU/mL at both, refrigerated and room temperatures. I also hypothesized that homemade yogurt would be least susceptible because it is prepared fresh daily.

Methods/Materials

A 1:4 dilution of 15 varieties of store brands and homemade plain/ strawberry, organic/ non organic yogurt each was prepared with sterile water. 1mL of each sample was inoculated onto two sets of 3M petri film Yeast and Mold count plates and incubated at room temp (72 degrees F) and refrigerated temp (42 degrees F). The pH level was measured and numbers of yeast colonies developed were counted daily. The experiment was repeated 2 more times but to keep the variables controlled, only 8 plain yogurts were tested. I then combined the best and worst performing yogurts in different proportions and used them as starter culture for improving the most susceptible yogurt. Finally, an anonymous survey was carried out to understand consumer habits associated with yogurt preparation and consumption.

Results

100% of yogurt samples developed yeast colonies > 10 CFU/mL by day 5 at room temperature. 7 out of 8 samples demonstrated yeast growth > 10 cells/mL at refrigerated temperature, confirming contamination. Exception was refrigerated sample of Voskos Greek yogurt. Maximum and fastest growth was observed in organic homemade yogurt. At both temperatures, the pH level decreased as yeast growth increased. Samples at room temperature were more acidic and developed more yeast. A 76% improvement in homemade yogurt was observed when prepared from 100% Voskos culture!

Conclusions/Discussion

Hypothesis 1 verified TRUE since 87% of yogurt samples proved susceptible to spoilage. Voskos Greek yogurt is strained of whey containing sugar and moisture, essential ingredients for yeast development. Yogurt made at home used starter culture from previous batches of yogurt possibly contaminated over time and involved no processing. Thus hypothesis 2 proved FALSE. Thanks to this experiment, my family is now eating the drastically improved yogurt I cultivated! This study raises significance and awareness of proper yogurt preparation, handling and consumption habits among consumers, particularly Indian families where yogurt is prepared at home on a frequent basis.

Summary Statement

Homemade as well as store brand probiotic yogurts are susceptible to spoilage due to development of yeast contaminants > 10 CFU/mL at both room temperature and refrigerated temperature.

Help Received

Parents helped with supplies and yogurt preparation/purchase; Prof. Hemmingsen provided preliminary direction prior to experimentation. Mr. Eric at Sun Valley Diary provided a tour of his yogurt manufacturing facility. Sarah and Ronit provided mentorship.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Jordan B. Robertson

Project Number

J1722

Project Title

Electrical and Magnetic Flow: Will It Affect How Bacteria Grow?

Abstract

Objectives/Goals

The purpose of my science fair project was to discover whether or not either electrical current or an electromagnetic field could stimulate bacteria growth. My hypothesis is that the electrical current will provide stimulus for the bacteria and cause to grow the best, as where the electromagnetic radiation given off by the electromagnetic field will very slightly hinder the bacteria#s growth.

Methods/Materials

I lawned thirty Petri dishes with sheep's blood auger then inoculated them with bacteria grown from a chicken breast swab. The dishes were sealed and ten were placed in each of my three incubators. The incubators are exactly the same, except one has a series of electromagnets running through its bottom, one has an electrical current and one is a control with nothing on its bottom. I used a light source (overhead projector) and a magnifying glass to count the number of cell colonies in each dish after three days.

Results

After concluding my testing, I observed that the incubators with electrical current posted the highest amounts of bacteria growth, followed by those with electromagnets, then finally, the control. The dishes subjected to the electrical current had an average bacteria colony count of 426 colonies, which was 311 colonies above the control's count of 115 colonies. In addition to the electrical current boosting bacteria growth, the dishes subjected to electromagnets had an average colony count of 190 colonies, which was 75 colonies higher than that of the control.

Conclusions/Discussion

My experiment proved quite definitively that an electrical current is a substantial growth stimulus to bacteria and also that electromagnets can slightly improve bacterial growth. Throughout my detailed analysis of these results, I have been unable to pinpoint the exact cause of why these variable increase bacteria growth but I am considering that it may have something to do with miniscule amounts of extra heat produced by the electrical current and the electromagnets' electromagnetic radiation. The next step is to revisit this project, except with mammalian cells to help indicate these forces effects on cellular growth and deeply explore the many medical applications of this project.

Summary Statement

In this project, I subjected bacteria to electrical current and electromagnetic radiation to see if either provided any growth stimulation, which could then be used to speed the process of growing transplant organs out of stem cells.

Help Received

Mother helped cut and glue papers for the board; Dr. Miller and Dr. Lubatti assisted in teaching me the proper procedures to grow, count, and safely dispose of bacteria; Mrs. Marcarelli helped come up with the title, edit all papers, and set up experiment; Mrs. Benson helped edit papers and deliver needed materials;

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Sarah Y. Root

Project Number

J1723

Project Title

Contaminated Carts: What Else Did You Pick Up at the Grocery Store?

Abstract

Objectives/Goals

The purpose of my experiment was to see how effective the antibacterial wipes, provided for customers at some grocery stores, were at reducing the amount of bacteria on shopping cart handles.

Methods/Materials

30 customers were timed for how long they used the antibacterial wipes to clean their cart handle. An average time was determined - 3.79s. 15 shopping carts were randomly chosen. Each cart handle was sampled using sterile swab with water and one side of a Petri dish was inoculated for the Before condition. A antibacterial wipe was applied to each handle for 3.79s then a second sample was taken from the handle and the other side of the Petri dish was inoculated for the After condition. Dishes were incubated for 24hrs and the bacterial colonies in each condition were counted and compared.

Results

The average number of colonies in the Before condition was 26.7 versus .33 in the After condition. Of the Petri dishes, 11 had no growth in the After condition, 4 out of the remaining dishes had only 1 to 2 bacterial colonies in the After condition and one dish had no bacteria growth in either condition after 24 hours of incubation possibly because of poor inoculation technique on my part.

Conclusions/Discussion

My hypothesis was supported with there being an average of 98.7% decrease in bacteria from the Before and After conditions. However, since on person wiped for15.53s and another for only .88s, additional studies could determine the optimal amount of time necessary to destroy or reduce bacteria on the handles. Also, only 30 out of 391 customers elected to use the wipes and 83% were women and only 17% were men. Future research could study ways to educate the public about the effectiveness of the antibacterial wipes in reducing or destroying pathogenic bacteria and thereby reducing illnesses and diseases.

Summary Statement

My project tested the effectiveness of bactericidal properties in wipes provided by grocery stores to clean shopping cart handles.

Help Received

Used lab equipment at Moorpark College under supervision of Ms. Lan Nguyen & Ms. Mary Swensen. My dad aka research assistant, timed me as I wiped cart handles. My mom helped me type some of my project, taught me how to find images online and nagged me to stay on schedule.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Miranda J. Ruth

Project Number

J1724

Project Title

Spice It Up: The Effect of Spices on Bacteria

Abstract

Objectives/Goals

The objective is to determine if spices have the ability to inhibit the growth of bacteria that commonly cause food poisoning.

Methods/Materials

Three different types of bacteria, Staphylococcus epidermidis, Bacillus cereus, and Escherichia coli, were incubated on a total of 72 nutrient agar plates. Eight different spices were each mixed with sterile water and applied to these plates. Bacterial colony counts on these plates were then recorded and compared to the control group which had the bacteria and sterile water only. In a second portion of my project, the effect of the same spices applied to diffusion disks on pure bacterial cultures was also measured.

Results

I found that cumin, lemon juice, cloves, and salt had the greatest inhibitory effect on the bacteria Escherichia coli and Staphylococcus epidermidis. Salt, cinnamon, oregano, and garlic had the greatest inhibitory effect on Bacillus cereus. For all three bacteria species, pepper was the poorest inhibitor.

Conclusions/Discussion

This experiment showed that spices do have the ability to inhibit bacterial growth. Certain spices were found to be more effective than others. Bacillus cereus was found to be more resistant to spices than Escherichia coli and Staphylococcus epidermidis.

Summary Statement

The objective is to determine if spices have the ability to inhibit the growth of bacteria that cause food poisoning.

Help Received

Father and mother supervised and helped culture bacteria and apply spices; Sister helped with box-and-whisker calculations with TI-84 calculator.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Marissa A. Salinas

Project Number

J1725

Project Title

The Effects of Seasonings on the Control of Escherichia coli in Hamburger

Abstract

Objectives/Goals

Part 1: How much Escherichia coli is found in Hamburger?
Part 2: Which spice affects Escherichia coli the best?

Methods/Materials

I will be using EMB agar to test the E.coli.
In addition, I will also be using four different types of spices. They are Cinnamon, Garlic, Oregano, and Sage.
One other item I will be using is five different meat sources. They vary from fast food chains, top of the line meat stores, and little corner stores.
The experimental test variables that I am using in my experiment are:

Results

Average of Non E.coli Coliform and E.coli in Hamburger Meat
The least number of bacteria growth was Meat From Store WM at 3.4 for Non E.coli Coliform and 0.55 for E.coli.
The largest number of bacteria growth was Processed at x Slaughter House at 16.6 for Non E.coli Coliform and 31 for E.coli.
Average Non E.coli Coliform and E.coli in Hamburger Meat Mixed With Cinnamon
The least amount of bacteria change was Meat From Store WM with 21.6 for Non E.coli Coliform and .2 for E.coli.
The most amount of bacteria change was Processed at x Slaughter House with 3.4 for Non E.coli Coliform and 0 for E.coli.
Average Non E.coli Coliform and E.coli in Hamburger Meat Mixed with Sage
The least amount of bacteria change was Meat From Store WM with 3.8 for Non E.coli Coliform and 0.8 for E.coli.
The largest amount of bacteria change was Processed at x Slaughter House with 1.6 for Non E.coli Coliform and 0 for E.coli.
Average Non E.coli Coliform and E.coli in Hamburger Meat Mixed with Oregano
The least amount of bacteria change was Meat Form Store WM with 10 for Non E.coli Coliform and .32 for E.coli.
The largest amount of bacteria change was Meat From Store LC with 9.8 for Non E.coli Coliform and 0.2 for E.coli.

Summary Statement

My project is about finding the amount of e.coli in hamburger and to see what spice affects it the most.

Help Received

Mother helped buy supplies and cut paper

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Jacqueline Shekhtman; Laura Thorsett

Project Number

J1726

Project Title

The Race Against Resistance: How Fast Do Bacteria Become Antibiotic Resistant?

Abstract

Objectives/Goals

The purpose of this experiment is to investigate the relationship between antibiotic doses and bacteria colony longevity using a computer model programmed in a language called Python. We wanted to find out how fast bacteria become antibiotic resistant. We also wanted to know if the number of doses, and the timing of the doses affect the longevity of the bacteria colony. Our hypothesis was that the longer a bacterial infection goes untreated, the harder it is to destroy the colony.

Methods/Materials

We used Python programming software and an iMac computer running OS X. We developed a simple computer model of a bacteria colony, including random mutations that make some bacteria resistant to antibiotics. We also modeled doses of antibiotics that kill most of the bacteria. In our first program we gave antibiotic treatment every five generations after the treatment started, and tried starting the treatment at different generations. We measured the size of the bacteria colony and ratio of antibiotic resistant-bacteria to non-resistant bacteria, and saw how that ratio changed when we tried different patterns of doses. At first all our model colonies became very large, so we tried a pattern of doses that would be more likely to kill the bacteria colony, giving a dose every generation after the treatment starts.

Results

Looking at our graphs, we could tell one thing for sure: every time, the percentage of resistant bacteria and the colony size rose with every generation. When a dose of antibiotics was given every five generations, the colony almost always grew faster than it died. When we provided antibiotics every generation, it became slightly more frequent that the colony size dipped or declined all the way to zero.

Conclusions/Discussion

Our hypothesis was correct because the longer time the bacterial infection goes untreated the faster the colony grows, but the frequency of the dosage matters as well. The percentage of resistant bacteria increases very quickly from zero percent to ninety-nine percent. Our results show that bacteria colonies can quickly become resistant to antibiotics. Because of this, our project could help scientists use computers to discover new, better antibiotics that kill bacteria quickly and could, with more research and experimentation, develop a frequency that is very successful.

Summary Statement

We made a model of bacteria growth and mutation, and tested the effects of different antibiotic dosing strategies.

Help Received

Rachel Thorsett (Laura Thorsett's mom) helped us learn Python programming.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Alec R. Steele

Project Number

J1727

Project Title

Wipe Away Staph and Bacteria: Beware of the Superbug

Abstract

Objectives/Goals

The objective is to test how well disinfecting wipes can reduce or eliminate Staphylococcus aureus and other bacteria from a commonly touched household area (the pantry door handle in our house).

Methods/Materials

Several swabs were used over several days and under dirty and disinfected conditions. Eisenhower Medical Center Microbiology Lab donated several blood agar petri dishes, inoculation loops, Catalase solution, Staphaurex solution, to test for the presence and amounts of staph and other bacteria. Some man hours were contributed by the microbiologists for training in the testing methods used in this experiment

Results

Progressive improvement and eventual eradication of staph was confirmed on the pantry door handle. The more the handle was wiped down with Lysol Disinfecting Wipes, the more staph and bacteria were eliminated. The staph and other bacteria did return to the pantry door handle over time when not being wiped with the Lysol wipes

Conclusions/Discussion

The Lysol Disinfecting Wipes were quite successful at killing off the staph and other bacteria; however, the bacteria tended to return after a few days of not wiping the designated area. This suggests that ongoing efforts are necessary to reduce the number of staph and other bacteria on commonly touched items in the house in order to lessen the likelihood of family members being infected by staph and other bacteria.

Summary Statement

The frequent use of Lysol Disinfecting Wipes on a commonly used door knob in my house eradicated Staph and Bacteria potentially reducing the spread of infection to my family members.

Help Received

Eisenhower Medical Center Bacteriology Lab provided me with the necessary materials to examine my hypothesis and conduct the research. The microbiologists taught me the proper techniques and interpreting the test results for the various cultures. My father drove me to EMC to conduct the lab portion of my

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Kisha G. Thayapran

Project Number

J1728

Project Title

I've Got Enough Milk! Leave Me Alone!

Abstract

Objectives/Goals

My project was to determine if pasteurized supermarket milk is free of any bacterial contamination and also whether milk that cames from cows treated woth rBST or milk free of rBST will increase bacterial growth.

Methods/Materials

6 different brands of commercially available supermarket milk was tested for any bacterial contamination. Milk samples were incubated in nutrient broth and subcultures in nutrient agar plates capale of growing Gram positive and Gram negative bacteria. E. Coli and Strep. Viridans were grown in milk and bacterial colony count was done using a nephelometer.

Results

Ross and Valutime milk with rBST had the highest amount of bacterial growth, 5188.89 colony count/mL and 5000.00 colony count/mL respectively. Knudsen and and Stater Bros had 2222.22 colony count/mL and 4444.44 colony count/ml respectively. Full Circle had 555.56 colony count/mL and Horizon had no growth. Bacterial growth was less in organic milk. E. Coli and Strep. Viridans were grown in four brands of milk. Valutime and Ross had the highest amountof growth, and they both had 3333.33 colony count/mL. The brands Full Circle and Horizon did not have rBST and both had 1477.77 colony count/ mL

Conclusions/Discussion

My conclusion is that organic milk that is not from cows treated with rBST is relatively safe to drink for all age groups..

Summary Statement

To determine if pasteurized milk free of any bacterial contamination and if milk with rBST or no rBST is safe to drink.

Help Received

My teacher, Mr. Harry Post, for correcting drafts, my parents for helping me with the board and buying th materials, used the microbiology lab at the Hemet Vallye Medical Center under the supervision of Microbiologist Butch Aying.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Rebecca N. Tsai

Project Number

J1729

Project Title

Rhus integrifolia: Investigating Antibacterial Properties of Leaves, Berries, and Bark

Abstract

Objectives/Goals

I am interested in microbiology. I heard myths about a local plant that is a member of the native coastal sage scrub community. The purpose of this project was to see if Lemonade Sumac leaf, berry or bark contained phytochemicals which might possess antibacterial properties.

Methods/Materials

In this experiment, I tested Lemonade Sumac leaf, berry, and bark water soluble extracts. Each extract was boiled for 40 minutes and cooled. Culture plates were prepared with 2ml of plant extract and 2ml of creek water (the source of bacterial contamination) mixed into Coliscan Easygel media. One tenth dilutions of creek water were also tested and mixed with the extracts in Coliscan Easygel media. I plated positive controls and negative controls to show the creek was contaminated and the media and dilution water were sterile. I verified the pH level of each extract. I obtained creek samples and repeated my experiment twice more for the bark and berry extracts only, since these extracts showed greater antibacterial effects. All samples were incubated and observed after forty-eight hours. There were a total of 54 tests in three different trials.

Results

The leaf extract did not show as great an impact on bacteria as the berry or bark extracts which demonstrated significant inhibitory effects. My last two trials included bark and berry extracts only. The number of non-Coliform colonies were remarkably low in the bark and berry extract plates. The total Coliform and E. coli numbers were significantly reduced low compared to the control plate numbers. Lemonade Sumac bark and berry extracts seemed to possess antibacterial properties.

Conclusions/Discussion

The ability of the berry extract to reduce the number of bacterial colonies may in part have been due to its low pH level, pH 2.7, but the bark extract had a pH of 4.0. The bark extract may have been able to decrease bacteria numbers due to its high concentration of soluble tannins. Bark extract eliminated most E. coli colonies and nearly all the non-Coliform colonies. The types of non-Coliform colonies eliminated were not identified, but these colonies may have included pathogens.

Summary Statement

The purpose of this project was to see if Lemonade Sumac (Lemonadeberry) extracts from leaf, berry, and bark contained phytochemicals which might possess antibacterial properties.

Help Received

Thanks to my mother and father who kindly drove me to locations numerous times to obtain plant samples, water samples and perform tests. Thanks also to my science teacher for guidance and support.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Alexandra L. Venable

Project Number

J1730

Project Title

Equine White Line Disease

Abstract

Objectives/Goals

I will collect and isolate samples from horses showing Equine White Line Disease symptoms then use DNA analysis identify Scedosporium ssp. as a causal microbe.

Methods/Materials

Nutrient agar, Petri dishes, inoculating loop, sample vials, hoof pick, cookie tray, box lid, lab coat, safety glasses, latex glove, hood, microscope slide, bunson burner, pipettes, water, cover slip, microscope and camera.
DNA Extraction:TE (Tris with EDTA),1.5ml tube,Microwave,Beaker,and Centrifuge.
Polymerase Chain Reaction:Master Mix,Thermo-cycler,Freezer,Agarose gel,TE Running buffer,Electrophoresis gel box,Loading dye,UV lamp,Gel-documentation system,Thermo printer,Saccharomyces cerivisiae, and 1KB marker.

Results

I was able to collect samples from horses showing symptoms of Equine White Line Disease and a horse with no signs of Equine White Line Disease. Petri dish cultures that looked like they were growing fungus were samples taken from horses 1, 2, 3, and 4, the horses that had originally showed signs of Equine White Line Disease. The culture of horse 5 who did not show signs of Equine White Line Disease showed bacterial like growth. All the Petri dishes from horses 1, 2, and 3 showed signs of fungal growth in the micrographs. We chose samples from horses 1, 2, and 3 and extracted DNA from them using a microwave procedure and PCR. When we ran the 9 samples and 1 control sample of Brewers yeast electrophoresis. Four of the 9 gel lanes showed smeared bands of DNA. The Brewers yeast showed no results. Because our bands were smeared and indistinct I could not get DNA that we could sequence. A second analysis of the same samples using a different microwave technique showed smears in 9 of the 9 lanes and the Brewers yeast again showed no results. As in the first analysis the bands were smeared and indistinct so I was unable to get a clean sample of DNA to sequence.

Conclusions/Discussion

My results do not deny or support my hypothesis because I able to extract and find DNA in 9 of 10 lanes. But the results were indistinct and smeared so I didn't get a clean sample of DNA to sequence and identify a fungus. The smeared results could be a result of the microwave techniques or the PCR cycles. Since the Brewers Yeast control did not show any signs of DNA I believe the technique needs to be refined.

Summary Statement

DNA analysis will identify Scedosporium spp. as a causal agent of Equine White Line Disease

Help Received

Used lab equipment at University of California at Santa Cruz under the supervision of David Bernick.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Melanie Voskanian

Project Number
J1731

Project Title
Is the Five-Second Rule a Myth?

Abstract

Objectives/Goals
The #Five-Second Rule# states that the amount of bacteria an object collects when dropped on the floor depends on how long it was on the floor. I am trying to find out if that rule is a myth, and whether wet or dry food collects more bacteria. I hypothesized that time is not a factor in the amount of bacteria an object will collect, and that wet food will collect more bacteria.

Methods/Materials
I took a cracker and salami and rubbed them on petri dishes. I dropped a cracker and salami on the floor, picked them up after three seconds, and rubbed them on petri dishes. I did the same thing, but I waited thirty seconds instead of three. I did the same thing again, waiting sixty seconds. I repeated each step three times. I waited three days, examined the dishes, and collected data.

Results
I found that time is not a factor in the amount of bacteria an object will collect when dropped on the floor, and that both foods collected about the same amount of bacteria.

Summary Statement
I am trying to find if time is a factor in how much bacteria an object gathers, and whether wet food will collect more bacteria than dry food when dropped on the floor.

Help Received
My dad helped me during my experiment.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Natalie J. Wu-Woods

Project Number

J1732

Project Title

Do Essential Oils from Herbs Inhibit the Growth of Bacteria?

Abstract

Objectives/Goals

My question is "do essential oils from herbs have an effect on bacteria growth?" I will be focusing on growth of E. coli on bacterial plates to test this experiment.

Methods/Materials

I used the disc diffusion assay to measure the effect of the oils on E. coli growth. I diluted essential oils from seven different herbs (Cilantro, Sage, Anise, Rosemary, Cinnamon, Thyme, and Oregano) with dimethyl sulfoxide (DMSO). I made five different concentrations -- 100%, 50%, 20%, 10% and 5% in DMSO. I used a micropipettor to put ten microliters of diluted oil onto a paper disc. The is put onto a plate with bacteria in it. The plates are placed into an incubator at 37 degrees Celsius. After 20 hours of incubation I measured the distance of the clear ring from the paper disc that does not have bacteria growth, record data and take pictures.

Results

I tested the herbal oils from Cilantro, Sage, Anise, Rosemary, Cinnamon, Thyme, and Oregano at 50% concentration. I did two trials for Oregano, Thyme, and Cinnamon in the second round after eliminating Cilantro, Sage, Anise, and Rosemary because they didn't work well. Oregano was better at killing bacteria at 20% concentration than the other oils. At 10 percent concentration, Oregano worked much better. I also test Oregano at a 1% concentration and found it still inhibited bacteria from growing on the plate

Conclusions/Discussion

Do oils extracted from herbs block bacterial growth? In my experiments, I tested oils from seven different herbs for their effect against bacteria. Cilantro, Sage, Anise, and Rosemary did not inhibit bacterial growth, while Cinnamon, Thyme, and Oregano oils had clear inhibition rings where bacteria did not grow. Based on my background research, I knew Cinnamon would work very well. For Thyme I did the same dilutions as Cinnamon. In summary, Thyme worked better than Cinnamon but not nearly as well as Oregano. Oregano worked at a lower concentration compared to any of the other oils. At 1% I still saw a measurable ring of inhibition. The outcome for 20% Oregano is about equal to Thyme's 50%. This shows Thyme is not as strong as Oregano but fairly strong compared to Cinnamon. In conclusion, Cilantro, Sage, Anise, and Rosemary, did not work very well. One the other hand, Cinnamon, Thyme, and Oregano worked great.

Summary Statement

I measured the ability of essential oils from 7 different common herbs to inhibit the growth of E. coli on bacterial plates.

Help Received

My Father helped design the experimental method and I used lab equipment under his supervision at Inscent, Inc.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Mollye L. Zahler

Project Number
J1733

Project Title
It's a Dog's Mouth

Abstract

Objectives/Goals
The objective of my project was to determine if a dog's mouth is really cleaner than a human's. I predict that a human#s mouth will be cleaner because dogs eat gross things.

Methods/Materials
Samples from the mouths of seven dogs and seven humans were obtained by swabbing and spread on petri dishes containing LB media. The dishes were incubated at 37ªC for 24 hours, then analyzed. I counted the number of colonies and the number of different morphologies from all the plates to determine which species had the most microorganisms living in their mouths.

Results
The average dog had 4.9 different types of culturable, visibly different microorganisms that could be grown on LB media at 37° C while humans had only an average of 3.7 different types of microorganisms in their mouths. Dogs also had more total microorganisms growing on their dishes with an average of 993 colonies and humans having an average of 502 colonies.

Conclusions/Discussion
Dogs have more total microorganisms and more different types of microorganisms in their mouths than humans, disproving the myth that a dog's mouth is cleaner than a human's.

Summary Statement
My project was testing the myth that a dog's mouth is cleaner than a human's.

Help Received
My dad showed me how to make growth media in his lab at the University of California, Santa Cruz.