CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Mirza H. Baig

Project Number
J1401

Project Title
The Effects of Herbs and Natural Remedies on Staphylococcus aureus: Year 2

Abstract

Objectives/Goals
There are nocosomial infectious bacteria like the Staphylococcus Aureus which no know antibiotics kill. It would be crucial to find an alternative use of potential killer for these types of bacteria. The objective is the possibility of finding natural alternatives for S. Aureus and/or no known antibiotic can destroy. It is hypothesized that the effect of natural herbs may be close to Amoxicillin to kill the S. Aureus.

Methods/Materials
To prove this theory, Staphylococcus Aureus was grown in Petri dishes with samples of Goldenseal Root, Echinacea Goldenseal mix, Fenugreek, Amoxicillin, along with Distilled water as control. The experiment was performed using sterile procedures working close to a flame and using isopropyl alcohol as needed. The Petri dishes were prepared with TSA and streaked with S. Aureus. Filter disks were dipped in samples of the Goldenseal Root, Echinacea Goldenseal mix, Fenugreek, Amoxicillin, along with Distilled water were applied. The Petri dishes containing the bacteria, herbs/Amoxicillin were incubated at 37 degrees C (TSA as medium), and examined after 24 and 48 hours for zones of inhibition. To be able to validate any of the findings, the experiment was performed four times.

Results
The results showed that Amoxicillin and goldenseal root inhibited the growth of Staphylococcus Aureus. The observations demonstrated that Goldenseal Root had average 6mm zone of inhibition around the disk and Amoxicillin had an average of 20mm zone of inhibition.

Conclusions/Discussion
The Goldenseal Root had substantial effect on the Staphylococcus Aureus this might synergistically improve the effect of the Amoxicillin or be used as an alternative so the antibiotic resistant strain. These results proved the hypothesis correct, therefore proving that the Goldenseal herb actually prevents bacterial growth. This research with the possibility of finding natural alternatives for bacterial infections without the harmful side effects of traditional medicine is favorable. This year#s experiment showed that there may be a cure for antibiotic resistant S. Aureus. This means by using the Goldenseal Root, it might be possible to synergistically increase Amoxicillin#s effect on S. Aureus.

Summary Statement
The objective is the possibility of finding natural alternatives for Staphylococcus aures without the harmful side effects of traditional medicine.

Help Received
This experiment was performed at the City of Knowledge School#s Science Lab under the supervision of my teacher Laila Shahrestani and my mother Fatima Baig. My mother also helped in the typing.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Ian S. Borchard

Project Number
J1402

Project Title
The Unclean Green: The Most Efficient, Fish Friendly Method of Algae Control in a Pond

Abstract

Objectives/Goals
What is the most efficient, fish friendly way to keep a pond free of algae.

Methods/Materials
I tested four different methods of algae control; Aeration, a floating plant, barley extract, and a combination of barley extract and a floating plant. I also had one bucket of only water as a control. I put each of these methods into five different buckets of well water and put a clear 5 in. x 5 in. plastic insert in the buckets to test algae growth on the walls. The aerator was turned on for an hour each evening, controlled by a timer. I left the buckets in full sun for four weeks. I measured algae growth using a transparency test for green algae on the plastic insert, counting white algae clusters on the plastic insert, and counting of algal rings and fragments in a water sample.

Results
Number of algae rings and fragments in the water samples was 9 in the aeration method, 64 in the plant method, 285 in the control, 59 in the barley and plant method, and 217 in the barley method. When examining the white algae clusters found on the plastic insert, the aeration method had forty-five algae clusters, the plant method had two algae clusters, the control had thirty algae clusters, the barley and plant method had fifteen algae clusters, and the barley method had forty-six algae clusters. The transparency test scale I developed ranges from one to ten; one being completely transparent to ten being nontransparent. The aeration method rated nine, the plant method rated two, the control rated eight, the barley and plant method rated three and the barley method rated six.

Conclusions/Discussion
The aeration method was best at reducing algae levels in the water and the plant method was best at preventing algae from growing on the walls of the bucket and second best at reducing algae levels in the water. The aeration method results in the water observation may not be accurate in a real pond situation due to the small size of the bucket. Therefore, the plant method which rates lowest in algae growth for the other two methods of measuring algae seems to be the best method of overall algae control.

Summary Statement
I researched the most efficient, fish friendly way to keep a pond free of algae.

Help Received
Mother helped with writing the report; used microscope from Mesa Union's lab

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Drew H. Borchardt

Project Number
J1403

Project Title
The Effect of Microwave Radiation on Fruit Mold

Abstract

Objectives/Goals
Objective is to see whether differing amounts of time, seconds,of microwave radiation will effect growth of mold on one specific fruit; the raspberry.
"Do differing time amounts of microwave radiation affect the growth of fruit mold?"

Methods/Materials
Materials: airtight containers, microwave,a camera,labels for the groups, and raspberries.
Procedure: place 8 berries into each container. Label containers by groups A-D. Microwave groups for 5 seconds[A], 10 seconds[b],15 seconds[c], and 20 seconds [d]. Observe results of mold growth on raspberries and record observations for two weeks[first after one week then every 2 to 3 days until 2 week mark just to give the mold time to show.] This experiment will include refrigeration in order to simulate normal habits of typical families. Observation of mold growth will be based on percentages noted and conclusions formed from documented results. If there is a moldy berry in the groups, I will estimate how much of the berry has molded. Not all berries have to be moldy to record percentages, as the mold can spread, and any mold can be a problem for entire group. Also, if micro waving the fruit for a set time is effective, there should be no mold on the entire group. Any amount of mold is significant.

Results
Results are the more radiation you expose the berries to , the more mold will sprout, also mold process speeds up. The reason for the process speeding up is found in further research, mold needs; dark, moist, and HEAT[radiation]. So by adding radiation, a form of heat, sped up process.

Conclusions/Discussion
Conclusions are the more radiation you add more mold will show,and mold growth process will be faster. The control group with no radiation showed least amount of mold; 18.75 percent. Group A, with 5 sec., had a steady mold growth of 56.25 percentage throughout process. Group B, with 10 sec., showed the most mold; 90.75 percent. Group C with 15 sec., doubled and had 3rd most mold growth; 68.75 percent. Group D started with 0 percent until 13th day and jumped to an amazing 75 percent! In addtion adding any amount of radiation is actually worse for the fruit than leaving it alone. In order to confirm these results, the experiment would need to be replicated at least 3 times in a controlled environment, with the same parameters. Even still, I am excited about these initial findings and believe they are intriguing enough to pursue more study in the future.

Summary Statement
The effect of microwave radiation on fruit mold.

Help Received
Grandfather assisted with research and construction of board. Mother assisted with display arrangement.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Danamarie Carter

Project Number
J1404

Project Title
Toilet or Ice Water: Which Contains More Bacteria?

Abstract

Objectives/Goals
The purpose of this experiment is to compare the amount of bacteria in the ice machines and the toilet water in hotels. Do we know if the ice served from the ice machines are safe to drink and free from bacteria? The hypothesis of this project was the hotels toilet water will contain more bacteria then the water from the hotels ice machine.

Methods/Materials
The procedures done for this experiment was to first meet with the San Diego City Water Laboratory, to find out how they test for safe drinking water. Then you collect eighteen ice samples and toilet samples from 18 different hotels. After setting up the samples in the Petri dishes and pouring the agar in the dishes, the bacteria were allowed to grow.

Results
The results of the projects did not support the hypothesis. The results showed that the ice machine ice water contained more bacteria than the toilet water 72% of the samples.

Conclusions/Discussion
The conclusion was that the ice machine ice contains a significant amount of bacteria. In many of the samples the ice water was not safe to drink and the toilet water was less contaminated. The results show that the source (ice machines) perception of clean water is different from reality.

Summary Statement
The bacteria count in Hotel ice machien ice vs. the lobby toilet water

Help Received
The San Diedo Water Quality provided thier lab for me to conduct the testing. Mom drove me to all the hotels that I took samples at

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Michelle Chan; Viviane Nguyen

Project Number
J1405

Project Title
Trust Your Gut When It Comes to Chocolate

Abstract

Objectives/Goals
When it comes to chocolate, we are all torn between love for this luscious treat and fear of its supposed unhealthy hazards. However, there may be an incentive for consuming this indulgence: an intake of antioxidants which prevents heart disease and stimulates cells to become more resistant to forms of cancer. The purpose of this experiment is to compare the growth of the probiotic bacteria Lactobacillus Casei which can be found in our intestines with the application of red wine and dark chocolate. After conducting research, which revealed high antioxidant content in cocoa, a main component in chocolate, we hypothesized that dark chocolate would cause the greatest growth in Lactobacillus Casei, therefore indicating a greater antioxidant, content.

Methods/Materials
In order to test this claim, we grew replicas of the probiotic bacteria found in our stomach and intestines on Petri Dishes, incorporating either red wine or dark chocolate with the agar solution, and observed their colony growth and the size of their colonies in terms of diameter periodically for forty-eight hours.

Results
At the end of two day incubation, we discovered that chocolate showed the greatest growth of bacteria colonies. The control dishes followed in second place and the Red Wine Petri Dishes lagged behind with a significantly lower count of colonies. These results were reciprocated in the diameters of the colonies, as chocolate consistently produced colonies of the greatest diameter.

Conclusions/Discussion
Overall, our hypothesis proved to be correct, with the Petri Dishes containing chocolate displaying the most growth with colonies with the greatest diameter. However, the red wine Petri Dishes showed little to no growth, contesting our hypothesis of closely following chocolate in bacteria growth. Our speculation to this outcome is the alcohol present in the red wine may have killed the bacteria and can be followed up in a future experiment.

The results of this project highlights the sufficient health benefits of the nutrients in chocolate and red wine and promotes dark chocolate, which has an overall enhancement towards your health. Although these results are not necessarily life changing, these findings ought to assuage any guilty chocoholics (such as ourselves) for indulging in this heavenly treat.

Summary Statement
This project essentially explores the health benefits of red wine and chocolate through the growth of probiotic bacteria to determine which is more beneficial to the human body.

Help Received
Completed trials under the supervision of teacher and mentor Vivian Flora.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alyssa N. Cook

Project Number
J1406

Project Title
Dermatophytes: Analysis of the Canine Claw. Microorganism Identification in Healthy vs. Immunocompromised Animals

Abstract

Objectives/Goals
The objective of this experiment is first, to determine species of dermatophytes most likely to colonize the canine claw, and second, to explore how the percentage of dermatophytes varies with the dogs# clinical health. From these findings, veterinarians will be better able to diagnose canine claw fungal infections and begin appropriate first line medical treatment.

Methods/Materials
Eighty-eight claw tissue specimens were processed. Half of each sample was put onto a bi-plate with Sabouraud#s Dextrose Agar, while the other half was put onto DTM (Dermatophyte Test Media). The samples were blinded and coded.
Each bi-plate was observed and recorded every 72 hours for four weeks for color change and fungal colony appearance, and stained with lactophenol cotton blue stain to observe microscopically for characteristic fungal elements. Controls were also done for each method. Total cultures plated equaled 184.

Results
The data show that the majority of dermatophytes found in the canine claw are, in order of prevalence: Trichophyton mentagrophytes, Microsporum gypseum, Microsporum nanum and Microsporum canis. In the second part of the study, it was found that immunocompromised dogs had dermatophytes colonizing 20% (4 out of 20) of their population, while healthy dogs had 26% of their population colonized by dermatophytes (18 out of 68). Based on the null hypothesis, there was no significant difference between the healthy and immunocompromised groups.

Conclusions/Discussion
Although other veterinary studies indicated that Microsporum canis would be the most prevalent canine dermatophyte in skin and hair infections, my evaluation does not support this in regard to canine claw colonization. Trichophyton mentagrophytes was the most common dermatophyte found. These findings may reflect the subject#s geographical location or the unique microclimate of the claw. In the second part of my study, there was no significant difference in prevalence of dermatophytes colonizing healthy vs. immunocompromised animals. This may be because healthy animals are likely more active and therefore their claw tissue would be exposed to more environmental contamination over a longer period of time, causing a higher amount of colonization. These results provide important information to the veterinary community about canine claw dermatophytosis.

Summary Statement
This project studies which dermatophytes colonize the canine claw and examines whether immunocompromised dogs are more likely than healthy dogs to colonize dermatophytes.

Help Received
Dr. Doty assisted in the collection of claw specimens; Dr. Harbison assisted in the blinding of the project; Sharon Gard provided general information and reference samples; Dr. Ramachandran assisted with the statistical analysis.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alex S. Cooke

Project Number
J1407

Project Title
Lights of the Sea

Abstract

Objectives/Goals
For my experiment I wanted to see if I could increase or decrease the brightness of the dinoflagelates and the amount of time they glowed for by changing the amount of light vs. darkness in the dinoflagelates circadian rhythm.

Methods/Materials
I had five different groups which had different amounts of light vs. dark. The different amounts of light were: always light; always dark; 6 hours light 18 hours dark; 18 hours light and 6 hours dark; and my control which was 12 hours light 12 hours dark.
Every other day I stirred the dinoflagellates using an apparatus that I made and recorded the amount of light they gave off using a scale I made from one to ten and I also measured the length of time they glowed for. I did this over a course of fourteen days.

Results
The data I gathered showed my control 12 hours light and 12 dark was a lot brighter and stayed light for longer than all of the other groups.

Conclusions/Discussion
My hypothesis was incorrect. I thought that the dinoflagelates with more light would glow brighter and stay light for longer. Instead my control of 12 hours light and 12 dark was the brightest group and they stayed alight the longest.
Overall my results show that not varying the circadian rhythm of the dinoflagelates and keeping them on their normal light cycle is better than adding or taking away light.

Summary Statement
For my experiment I was seeing if the amount of light vs. darkness affected how brightly the bioluminescence in the dinoflagellates glowed, and if this also affected the amount of time the bioluminescence glowed for.

Help Received
Mum helped buy equipment .

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Anujin Dambaev; Vanessa Resley

Project Number

J1408

Project Title

War of the Worlds

Abstract

Objectives/Goals

One of the goals for our project was to discover the effects of the centripetal force on bacterial colonies. We wanted to determine whether or not bacteria grown under the centripetal force will become inhibited in colony numbers. We also wanted to discover bacteria's ability to adapt when placed under other forces.

Methods/Materials

We tested our hypothesis when we recieved permission to work at a college labratory and recieve access to E. coli and bacillus cultures. We used the following materials: 24 nutrient agar plates, 24 sterile inoculation loops, access to bacterial cultures, 1 turntable(able to reach 78 RPM), 1 spotlight, and 2 Celius thermometers. We set the turntable at 78 RPM and taped the experimental plates onto the turntable and placed a Celius thermometer to the side (this is to mantain the optimum bacterial temperature. The controls were placed the controls to the side and positioned the spotlight towards the plates. We practiced basic bacterial streaking methods and made sure that the area and the materials were sterile.

Results

The purpose of conducting this experiment was to distinguish whether or not E. coli's and bacillus's culture growth rates would become inhibited under another force. According to the test results, the longer the incubation time period given to the experimental bacteria, the faster the colony growth rate. The experimental 48 hour time period resulted in larger colony numbers than the regular controls for 48 hours. Although the experimental 24 hour time period displayed a sudden decrease in the colony numbers. By doubling the inbuation time, the bacteria colonies allowed enough time to adapt to the centripetal force that is acting onto the colonies.

Conclusions/Discussion

In conclusion, the effects of centripetal force is clearly visable for a longer incubation time period. The experimental 48 hour time period allowed the bacteria to adapt to the new force acting upon it. In this case, the centripetal force caused some bacterial colonies to die off therefore leaving the stronger colonies to pass it's genes to the next generation. These stronger genes would continously advance future bacterial generations causing the cycle of acquired bacterial resistance.Therefore bacteria's ability to adapt will allow colonies to survive under other forces and other environments.

Summary Statement

Our project is about the effects of the centripetal force of E. coli and bacillus bacterial colonies.

Help Received

Ms. Jennifer Pickens at Mountain San Jacinto College allowed the use of materials and labratory; Mr. Harry Post (Physical science teacher) guided us through the project; Mr. and Mrs. Dambaev purchased materials and provided transporatation; Mr. Resley provided transportation

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Eli W. Erlick

Project Number
J1409

Project Title
The Effect of Cinnamon on E. coli Growth

Abstract

Objectives/Goals
The objective of this project is to test the effectiveness of cinnamon on reducing the growth of E. coli in apple juice using an amount of cinnamon which allows the apple juice to taste pleasant.

Methods/Materials
Four samples were tested one with apple juice; one with apple juice and cinnamon; one with apple juice and E. coli; and one with apple juice, E. coli and cinnamon, They were allowed to incubate and then were plated on to petri dishes and allowed to grow. The growth was measured by taking photographs and calculating percent plate coverage using the program Adobe Photoshop. The experiment was repeated for a total of three trials.

Results
Overall the apple juice with cinnamon solution had less growth of E. coli than the solution with apple juice only.

Conclusions/Discussion
Cinnamon does suppress the growth of E. coli in apple juice and may be an effective preservative in this food. This may be useful for both the developing world as well as the organic food industry.

Summary Statement
The ability of cinnamon to suppress the growth of E. coli in apple juice was evaluated and it was found that a solution with E. coli, apple juice, and cinnamon had less E. coli growth than a solution with apple juice and E. coli alone.

Help Received
Dr. Carla Longchamp helped me analyze my data.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Sanjna S. Ghanshani

Project Number

J1410

Project Title

Got Pure H(2)0? Surveying the Microbiological Quality of Residential Water and Environmental Water Bodies

Abstract

Objectives/Goals

Is tap water free of biological contaminants and safe for drinking? The quality of drinking water varies from place to place, depending on the primary source of water and treatment it receives. As a curious consumer and an aspiring young scientist, I analyzed drinking water as well as environmental water bodies which simulate primary water sources for the presence of biological contamination.

Methods/Materials

Materials

Residential and environmental water samples,Colorimetric culture media(Readycult Coliforms),Kovacs indole reagent,MacConkey agar plates,Glass sample vials with caps,Transfer pipettes,UV long wave light source,Bacterial Incubator,Positive control:Laboratory strain E. coli

Procedure

.Collect 10 mL water samples from a variety of sources.

.Immerse a 10 microliter inoculating loop into the water sample and spread it on the MacConkey plate by streaking. Check for bacterial growth on the plate after 24 hour incubation at 37°C.

.To each sample add Readycult colorimetric culture media and incubate as above

.A color change to green-blue color indicates presence of coliforms.

.Blue florescence under UV light indicates presence of E. coli.

.Add a few drops of the Kovacs reagent to the top of the sample and look for a red ring to confirm E. coli presence.

Results

Tap water did not undergo the blue-green color change in the Readycult Coliforms media nor did it fluoresce under UV light. These samples also did not produce a red ring in the indole test. Thus, tap water was free of bacterial contamination. In contrast, run off-water as well as water from community lakes produced a blue-green color in Readycult media, fluoresced under UV light, and produced a red ring in the indole test, suggesting E. coli presence. Water samples from the ocean remained yellowish in the colorimetric media but did not fluoresce under UV light.

Conclusions/Discussion

Drinking (tap) water in my home is free from bacterial contamination. Water samples from lakes and bays were consistently unsanitary and usually contaminated with fecal matter. Ocean water was cleaner in that it did not have any fecal coliforms.

Summary Statement

A rigorous test to survey the microbiological quality of residential water and environmental water sources.

Help Received

Mr. Mark Hobbs, science teacher, provided support and supervision. Parents helped with acquiring materials, reviewing documents and ongoing discussions about the project.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Sarah E. Gibbs

Project Number
J1411

Project Title
Determining Which Fabrics Will Inhibit the Passage of Bacteria

Abstract

Objectives/Goals
My project was to determine if different fabrics would inhibit bacteria from getting to the skin. I simulated a sneeze onto different types of fabrics. (clothing)

Methods/Materials
I used a nutrient broth that was inoculated with bacillus subtillus. (Bacillus was obtained from the high school) The bacterial broth was put into a sterilized spray bottle.
I then obtained different materials. (Cotton , wool, silk, and polyester) These were cut into 6in by 6 in squares. The squares were placed over a Petri Dish with nutrient agar.
I sprayed one pump of the bacillus over the material from exactly 6 in away (simulated sneeze)
Repeated for each material and control (no material over petri dish)
3 trials for each fabric. I let the bacteria grow for 7 days. I counted bacterial colonies and compared results.

Results
After1 week, polyester proved to be the material that inhibited the most growth. an average 46.67 colonies. Next was cotton with 90 colonies, then silk with 223.34, and last was wool with 263.34. These were all pretty good next to the control. The control was 606.67

Conclusions/Discussion
I learned that polyester was the best material in protecting bacteria from passing through to your skin. If you had a young child,this type of clothing could possibly help protect from direct sneezes. Cotton also helped protect the skin. Polyester is the only man made fabric that I tested.

Summary Statement
My project was to determine if the type of materials you are wearing can help protect you from bacteria.

Help Received
Teacher obtain materials and taught scientific method. Parents help supervise, and helped put board together.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Melissa A. Gore

Project Number
J1412

Project Title
Algae vs. Acid Rain

Abstract

Objectives/Goals
The purpose of this project was to test the effects of acid rain on algal cellular structures. I tested this by adjusting the pH levels of pond water and algae, then observed over a ten-day period. I then rated the algae cellular structure and rated the deterioration by observing the algae under a 10x power microscope. I believed that if I changed the pH levels of the pond water and algae samples I should see the cellular structure of the algae begin changing within the pH levels of 5-6 because those are the levels considered to be that of acid rain. I believed that my sample with 11ml Muriatic acid would die first because it is the most acidic. According to my research acid rain has a negative affect on the earth#s ecosystems including our large and small bodies of water.

Methods/Materials
My test methods included filling seven bowls with 100ml of pond water and 5ml of algae each, then I poured six different amounts of Muriatic acid 1.25ml, 2.5ml, 5ml, 7ml, 9ml, and 11ml in six of the bowls (independent variables) and one bowl without any acid to be my control variable. I tested the pH levels of the samples and placed them all on a heating pad at 20 degrees Celsius, in a box that was placed near a window. I observed the samples for 10 days at the same time of day and rated the cellular structure using a six point system.

Results
The results of my project showed that my hypothesis was correct. The bowl with the most acid, 11ml died faster than any other samples in my bowls.

Conclusions/Discussion
I discovered the higher the acid level, the more toxic the pond water. Since my research shows that acid rain, or more correctly acid precipitation is created by the burning fossil fuel, I believe that it is very important for the world that we find alternate sources of energy & cleaner ways to power our factories, automobiles, and different ways to heat our homes. During the course of my research I found that algae is being used to absorb CO2 around factories in turn cleaning the air and reducing pollution. There are also companies exploring the possibility of using algae to produce bio-fuel and reduce our need for fossil fuel. In future experiments I would use a higher power microscope with photographic ability.I would use sulfuric and nitric acids because they are the types of acids created from the burning of fossil fuels. I would test different types of algae instead of just one type of algae.

Summary Statement
This project was conducted to test the effects of acid rain on algal cellular structure over a period of time.

Help Received
Mrs. Bloom let me borrow her microscope. My mom supervised me during my experiment

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Anthony (Andy) V. Granatelli, III

Project Number

J1413

Project Title

The Effect of Vitamins, Minerals, and Iron on Ethanol Production

Abstract

Objectives/Goals

My objective was to find out if adding vitamins, minerals, and iron to a sugar solution fermented by yeast would increase ethanol production. I thought that the container with the vitamins, minerals, and iron would have the most ethanol because it would have more nutrients to draw on.

Methods/Materials

First I sterilized all three 4.5 liter glass containers. Then I mixed the water,sugar,pectic enzyme,Camden tablets,and yeast nutrient together in an 18 liter stainless steel pot. I took a hydrometer reading of each container to measure the potential alcohol each week. The first glass container was my control and had no added vitamins,minerals,and iron. The solution in the second container consisted of vitamins,and the solution in the third container consisted of vitamins,minerals, and iron. I fixed an airlock to each container and took regular readings at week long intervals for five weeks.

Results

The results showed that the solution containing vitamins,minerals, and iron had the most rapid rate of fermentation. The solution with the vitamins had an initial fast rate of fermentation but slowed down in the end. Both the vitamin and iron and the vitamin had a faster rate of fermentation compared to the control.

Conclusions/Discussion

It is interesting that the vitamins and iron managed to keep a faster rate of fermentation as can be seen by the graph. This may indicate that iron contributes to fermentation. I think that the vitamins and the iron gave the yeast more nutrition so it performed better. The graph also shows that at the beginning the vitamins were a clear factor in this experiment but towards the end the rate of fermentation sharply declined. The control was slow but steady and did not decline as much as the others did. While collecting my initial research, I found that yeast consists of protein and B vitamins. Perhaps the additives which include B vitaimns enhanced the rate of fermentation. My results could have possible implications for industrial ethanol production. Therefore, by adding vitamins, minerals and iron to the specialized enzymes, yeast fermentation may be more efficient. This could lead to positive economic consequences by making the production of ethanol increasingly more cost effective and therefore warrants further investigation.

Summary Statement

My project was to investigate if adding vitamins,minerals,and iron to a sugar solution fermented by yeast would increase ethanol production and thereby making the process more cost effective.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Vy-Luan K. Huynh

Project Number
J1414

Project Title
Effectively Using Iron and Phytoplankton to Sequester Carbon

Abstract

Objectives/Goals
The objective of this experiment is to determine the optimal amount of iron to give to phytoplankton in order to produce the most growth in a set period of time for practical use in the process of carbon sequestration via photosynthesis.

Methods/Materials
Utilizing the navicula incerta species as the test subject, counted samples of plankton were placed into six pairs of flasks, each set of two containing a different dilution - a control group with no extra nutrients, and 1nM/5nM/10nM/50nM/100nM concentrations - of iron-enhanced seawater solution. Over a period of eleven days, well-mixed samples would be taken from each of the dozen containers and placed on a specialized counting chamber slide beneath a compound microscope. This grid-marked slide allowed only a small fraction of visible plankton to be counted then multiplied by a specific number in order to find an approximation of the total cells per milliliter in the flask. The data were later converted into overall percent increases.

Results
After repeating the process three times, it was found that a 5nM concentration of iron caused the most growth, increasing organism population by a total of 174% on average. Both the 10nM and 50nM solutions also proved fairly effective by creating 161% increases themselves, and the 100nM solution was the least useful with an increase of 137%. Neither the control group nor the 1nM flask caused excessive growth, with 149% and 152% increases respectively.

Conclusions/Discussion
Previous research done by marine biologists suggests that plankton can react to small amounts of iron in their environment, and this is reflected by the effectiveness of the slight 5nM solution. The lack of consequence in the 100nM flask, holding the greatest addition of iron, may support this knowledge in that it hindered the development of the navicula. These results imply that tinier additions of iron to seawater will be most effective at helping navicula plankton multiply and retain their numbers over a longer period of time, showing that the best possible concentration to remove the most carbon dioxide from the atmosphere will be around 5 to 10nM.

Summary Statement
Various amounts of iron were added to phytoplankton in order to determine which addition produced the optimal, most economical growth for carbon sequestration purposes.

Help Received
Drs. Chapman and Brzezinski for plankton, chemicals, and feedback; Peggy Lynch for supplies, feedback, and effective concept teaching; Chris Broomell for lab usage; Kim Miller for support, feedback, and material storage; and parents for transport, supplies, etc.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Hannah S. Kintzle

Project Number
J1415

Project Title
Do Natural or Pharmaceutical Antibiotics Work Better at Preventing Antibiotic Resistance from Occurring within Bacteria?

Abstract

Objectives/Goals
The objective was to determine whether natural or pharmaceutical antibiotics would be better at preventing antibiotic resistance from occurring within bacteria.

Methods/Materials
Materials included 30 each of the following: Easygel bottles, Easygel pretreated Petri dishes, Chloramphenicol, Tetracycline and Penicillin disks; honey; garlic; 6 sterile 1 ml. droppers; 10 forceps; and 5 sheets of graph paper. I gathered twelve Petri dishes and labeled each with the pharmaceutical or natural antibiotic to be used in it, bacteria type, and experiment number. Next I inoculated four easygel bottles with two drops of Enterobacter Aerogenes, four easygel bottles with two drops of Bacillus Cereus, and four easygel bottles with two drops with Sarcina Lutea. I poured the easygels into their respectively labeled Petri dishes. I let the inoculated Petri dishes sit. I placed three Chloramphenicol disks into three of the four Petri dishes. I repeated this procedure with the Penicillin and Tetracycline disks. I then placed honey and garlic in the fourth dish. I placed the lids on the Petri dishes and let them sit for 45 minutes, then moved them to a consistent temperature to sit for 60 hours.

Results
Of the pharmaceutical antibiotics, Chloramphenicol was the most effective. Of the natural antibiotics honey was most effective. These two antibiotics demonstrated greater zones of inhibition, therefore greater effectiveness at inhibiting the growth of microorganisms.

Conclusions/Discussion
I believed that the pharmaceutical antibiotic Penicillin would be best at preventing antibiotic resistance within bacteria. The experimental data did not support my hypothesis. Chloramphenicol was most effective. Of the natural antibiotics honey was most effective. My conclusions were based upon observations of greater zones of inhibition in these two antibiotics. Comparing Chloramphenicol to honey, honey had larger zones of inhibition, although I did not consider volume. An additional consideration is that the sugar levels in the honey could be killing the bacteria rather than creating resistance.

Summary Statement
I wanted to determine whether natural or pharmaceutical antibiotics would be better at preventing antibiotic resistance from occurring within bacteria.

Help Received
Mr. Don Scott provided guidance and project review work; Mother assisted with experiments and editing.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Natalie S. Kolber

Project Number

J1416

Project Title

Salicylate Induced Antibiotic Resistance to Ampicillin in Escherichia coli

Abstract

Objectives/Goals

The objective of this experiment was to determine whether and what concentration of salicylate can induce phenotypic antibiotic resistance to ampicillin in E. Coli.

Methods/Materials

E. Coli (strain K12) were grown in liquid cultures of 1 mM, 3mM, 5mM, and 0 mM (control) of salicylic acid. They were then plated and tested for resistance against ampicillin using the Kirby-Bauer disk diffusion method.

Results

Bacteria grown in solutions of 3 mM and 5 mM developed equal levels of resistance, with zones of inhibition 29.69% smaller than the control. Bacteria grown in a solution of 1 mM showed zones of inhibition 19.92% smaller than the control.

Conclusions/Discussion

Salicylates are chemicals that are widely used in acne creams, toothpastes, and agriculture, as well as the active ingredient in aspirin. Most of us have no idea that this ubiquitous molecule renders bacteria even more dangerous to us. Many other areas of research that may stem from this study include the time frame of salicylate-induced resistance, inducing phenotypic resistance directly from commercial products, and whether culturing bacteria in a mixture of ampicillin and salicylate would induce phenotypic or genotypic resistance.

Summary Statement

This experiment is about phenotypic (nonheritable) resistance to ampicillin in E. Coli as a result of exposure to salicylate.

Help Received

Used lab equipment under supervision of Mr. Lay (science teacher) at GBK school science lab.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Ivanna L. Lizano

Project Number
J1417

Project Title
Which Situation Will Produce More Bacterial Growth and Sweat?

Abstract

Objectives/Goals
My experiment was to show how much bacterial growth was going to be produced.

Methods/Materials
Clean Jars
4 packets of unflavored gelatin
One cooking spoon
One pot or pan
One tsp. of sugar
½ cup water
Cotton swabs

Results
#Barefoot# only had one moldy spot. #Socks and Shoes# had four or five moldy spots. The jar that was left to check was the one that surprised me the most. #Shoes but No Socks# was covered in mold! Where I had swabbed it, I could see tiny, moldy spots. I could also see about five regular-sized moldy spots. What surprised me the most was something as obvious as a big pink elephant in the room. There was a big, wispy-looking #blob# in one of the corners. It had to be at least half an inch tall (or more).

Conclusions/Discussion
My hypothesis was that #Shoes but No Socks# would produce more sweat and bacterial growth. The other samples had spots ranging from one through five. However, #Shoes but No Socks# had a big, wispy-looking #blob# in one of the corners and also had many, many spots varying in size. Therefore, based on what I saw, I concluded that my hypothesis was supported.

Summary Statement
My experiment was to show how much bacterial growth was going to be produced when you exercise in different situations.

Help Received
I would like to thank my parents for helping me get all the supplies I have needed for this science fair project. I would like to thank my science teacher, Mrs. Schanen, Ms. Angie, and Ms. Ong for answering the questions I had and helping me at the same time.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
William C. Lorenzen

Project Number
J1418

Project Title
Smoking Mold: How Cigarette Smoke Affects Mold Growth on Bread

Abstract

Objectives/Goals
I examined the effects of cigarette smoke exposure on the rate of mold growth on bread. My objective was to find out whether or not cigarette smoke halts natural growth processes in the body.

Methods/Materials
I created two smoking chambers and exposed eight pieces of wheat bread to either cigarette smoke or fresh air being blown in by an air mattress pump.

Results
At the end of my experiment my results showed that the pieces of bread that had been exposed to smoke had grown no mold or had any signs of mold but the pieces of bread that had been exposed to fresh air had grown mold at the expected pace.

Conclusions/Discussion
This supports my hypothesis completely, although I did not expect no mold to grow on the bread.

Summary Statement
The effects of cigarette smoke on mold growth on bread.

Help Received
Dad bought materials and supervised experiment.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jimmy G. Madigan

Project Number
J1419

Project Title
Where's the Plankton?

Abstract

Objectives/Goals
My objective in this project was to find out how and where plankton is most abundant in the Newport Harbor, California. I sampled bay water in five different locations including the Balboa Pier, the West Jetty, the Turning Basin, the Back Bay Bridge , and the Rhine Channel. My hypothesis was that there would be more plankton in the Rhine Channel than anywhere else because of less water flow caused by the tide.

Methods/Materials
1. One jar for every location sampled
2. Strong Wire
3. A pair of panty hose
4. One embroidery hoop
5. Three to five strong rubber bands
6. A small jar or vile for the net
7. Snap swivel
8. Stong Microscope
9. Blank slides and covers
10. Tissue to wipe slides
11. Notebook
12. camera

Results
After sampling all of the locations, I went back home to start to observe. I would stir the sample with a spoon and would put a drop of water on a slide. After looking over the slide through the microscope, I gave it a rating. A - very dense, B - Dense, C - medium and D - low density, and E - none or almost none. After doing this five times for each jar of water, I came up with an average rating. The Rhine Channel ended up with a rating of A - very dense. I also learned from research that plankton prefer calm water.

Conclusions/Discussion
It turned out that my hypothesis was correct. I thought that out of all the samples I observed, the Rhine Channel stood out the most. There was plankton everywhere on the slide. The plankton were more dense in this area because the flow of water is not very strong like it is in other more open areas of the bay. This abundancy of phytoplankton attracts zooplankton such as jelly fish. This increases the population of plankton.

Summary Statement
IMy project, "Where's the Plankton?", is about plankton density in five different locations in Newport Harbor.

Help Received
My Dad drove the boat while I collected the samples in the bay. My Mom helped glue down the map on my project poster board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Samir Malhotra; Sumedh Shah

Project Number
J1420

Project Title
Are Yeast Cells Temperature Sensitive?

Abstract

Objectives/Goals
This research experiment was done to study the effect of different temperatures on the growth of yeast. Our goal was to determine at which temperatures do yeast cells grow the best at.

Methods/Materials
Yeast cultures were grown at 30°C in a water bath and their growth rate was measured in a time course experiment. New cultures were inoculated from this culture into a glucose plus sucrose growth medium. Five cultures were inoculated and placed at different temperatures as follows: 4°C, 10°C, 20°C, 30°C, and 40°C. Yeast cells were counted at zero time, sixteen hours, and twenty hours by taking a cell count using a hemocytometer. At the same times, the gas produced by the cells was measured by gas pressure sensors. Experiment was repeated and duplicate samples were used for both tests, and the data was recorded for analysis. Viability of yeast cells was confirmed by microscopic examination and methylene blue stain.

Materials used: 20 Pipettes; 2 packets of Red Star Yeast; 30 g of sucrose; 15 g of glucose; 11 flasks; 300 mL distilled water; 2 hemacytometers; 1 water bath; 1 refrigerator; 1 Vernier Gas Pressure sensor; 16 test tubes; 20 mL vegetable oil; Laptop computer; 1 Vernier interface; 15 Cover slips; 2 microscopes; 2 Stirring Rods; 1 microentrifuge.

Results
Our results showed that yeast cells gew the best at 30°C, followed by 20°C (room temperature). At extreme high and low temperatures (4°C and 40°C) the cells failed to grow. In addition to a reduced cell number and a slower rate of CO(2) gas productio, the cells also showed other changes at the extreme temperatures. At 10°C the cells clumped together, as observed from under the compound microscope. At 40°C most cells stopped dividing and died after 16 hours as indicated by methlyene blue analysis.

Conclusions/Discussion
According to the gas pressure and cell counts data from our experiment, yeast cells grew the best at 30°C followed by 20°C. There was minimum growth observed at 10°C and 40°C. No growth occurred at 40°C. Microscopic analysis showed that the cells clumped together at lower temperatures and died at high temperatures. So, our hypothesis was right, because the sample at 30°C had a better growth rate than all of the other samples.

Summary Statement
We studied the effect of different temperatures on the growth of yeast cells.

Help Received
Used the compound microscope, hemacytometer, and gas pressure sensors in Dr. Malhotra's lab at Thousand Oaks High School

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Dayle M. Morris

Project Number
J1421

Project Title
Investigating the Effects of Preservatives and Additives in Preventing Mold Growth in French Fries

Abstract

Objectives/Goals
My project is an investigation into what is actually in the French fries we eat and the oil in which they are cooked. My initial idea was to try and determine if freshly made French fries such as those from In N Out Burger, that are cut in front of you, would get moldy faster than those from traditional chain fast food restaurants that contain preservatives and food additives. I also wanted to determine if freezing fresh potatoes was a good alternative to adding preservatives and food additives.

Methods/Materials
In order to determine the connection between delayed onset of mold development and the freshness of the fries, I purchased French fries from seven different fast food restaurant chains. I performed 11 trials of my test on each kind of fries (77 trials total) by placing the fries in sealed glass jars and recording mold growth. I conducted internet research and studied the ingredient lists to determine which French fries had food additives and preservatives and to determine the types of food additives and preservatives in each kind of French fry. I then waited to see which fries would get moldy first and to see if the long list of food additives and preservatives added to some very popular French fries really worked to delay mold growth.

Results
Ultimately, the results of this project revealed that simply freezing 100% fresh potatoes was almost as effective as adding preservatives and additives at delaying mold growth and maintaining freshness. Secondly, I learned that there are a lot of chemicals and additives in most fast food French fries and the oil that they are cooked in too.

Conclusions/Discussion
During the course of this experiment I learned that not all French fries are plain potatoes, and that even the type of oil they were cooked in varied. Some restaurants added silicon polymers (which are man made) to their oil and others used pure vegetable oil. There were a lot of variables in the both the content of the oil and the French fries. One popular French fry was also found to contain milk and beef products along with potato, all of which were then cooked in oil that was itself full of additives. I also learned that freezing fresh potatoes is a really good way to prevent mold growth without adding preservatives and additives to food.

Summary Statement
My project investigated the effects of adding preservatives to french fries vs. natural methods of preparation

Help Received
Teacher Karen helped format logs & my, mom helped edit report and with project board layout

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jennifer N.T. Ngo

Project Number
J1422

Project Title
Bacterial Contaminants in Self-serve Ice Dispensers at Fast Food Restaurants

Abstract

Objectives/Goals

The purpose of this experiment was to determine if there are any bacterial contaminants growing in self serve ice dispensers at fast food restaurants. The hypothesis was that there will be none or insignificant traces of harmful bacteria that are not enough to cause diseases. The Eosin Methylene Blue (EMB) medium was used to help determine specific gram negative bacteria that can cause harmful diseases. Samples from five fast food restaurants were collected over a two week period. A total of 60 samples were collected. There was evidence that showed bacterial growth in all of the restaurants tested. The findings from these restaurants were consistent with the hypothesis in which the small amount of bacterial growth was not significant enough to cause harmful diseases to the consumers. Even though the amount of bacteria was small, it could signify a serious problem if the restaurant does not take measures to prevent future bacterial outbreaks. These outbreaks could be prevented by the restaurant#s employees adhering to proper cleaning procedures of all equipments. Both the restaurant employees and the consumer should employ proper hand washing techniques to prevent diseases.

Summary Statement

The purpose of this experiment was to determine if there are any bacterial contaminants growing in self serve ice dispensers at fast food restaurants.

Help Received

Dr. Murphy, for helping me with the research topics and dispose of the bacteria. Mrs. Madsen, science teacher, for the use of the incubator. My father, for his expertise in the use of the digital camera. My mother, for driving me to the restaurants to collect specimens and helping me with the writing.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Maariyah Patel

Project Number
J1423

Project Title
Are You Sun Savvy? Protecting Serratia marcescens against Ultraviolet Radiation

Abstract

Objectives/Goals
The purpose of my experiment was to observe the effects of short term ultraviolet light exposure on bacterial growth. I also wanted to determine whether sunblocks will protect the bacteria against damaging effects of UV light, and whether the physical ingredient, titanium dioxide, or the chemical ingredient, oxybenzone, in sunblocks is more effective in protecting bacteria against ultraviolet light exposure. I hypothesized that the longer the exposure to ultraviolet light, the less bacterial growth. I also hypothesized that the physical ingredient, titanium dioxide, would protect the bacteria better than the chemical ingredient, oxybenzone.

Methods/Materials
For each experiment, nutrient agar plates were streaked with diluted Serratia marcescens using a calibrated loop. Experiment 1- plates were labeled and exposed to UV light for a specified but differing time period. The control plate was not exposed to the UV light. After exposure, plates were incubated for 24 hours. Colony count recorded. Three trials were performed. Experiment 2- sunblocks tested had been selected so that their only difference in active ingredients would distinctly be titanium dioxide or oxybenzone. Titanium dioxide and oxybenzone sunblocks were each spread onto separate plastic wrap sheets, which were placed over the plates. Two controls were also created. The plates were exposed to UV light for specific time lengths throughout three trials. After exposure, plates were incubated for 24 hours. Colony count recorded.

Results
After incubation, Serratia marcescens not exposed to UV light were observed to have grown into distinct colonies. Bacterial growth decreased significantly with increasing time exposure. None of the bacteria exposed to UV light for 3, 4, or 5 minutes survived. I also observed that the titanium dioxide sunblocks protected at least 15% more Serratia marcescens than the oxybenzone sunblocks, irrespective of the time exposure.

Conclusions/Discussion
The results proved my first hypothesis partly correct. As the UV light exposure time increased, the bacterial growth decreased. However, it was not expected that Serratia marcescens bacteria exposed to ultraviolet light for 2 minutes would result in almost complete mortality. My second hypothesis was proven correct. From my results, I concluded that the titanium dioxide sunblocks were more effective in protecting Serratia marcescens against ultraviolet light than oxybenzone.

Summary Statement
In this experiment, I observed the effects of short term ultraviolet light exposure on Serratia marcescens, and determined that titanium dioxide is more effective than oxybenzone in protecting Serratia marcescens against UV radiation.

Help Received
I used the equipment at the LAC+USC Microbiology lab. My mother and father provided me guidance.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Miranda K. Patrick

Project Number
J1424

Project Title
Yeast the Great Beast and How He Metabolizes

Abstract

Objectives/Goals
The purpose of this investigation was to determine if yeast produced more carbon dioxide by taking away the oxygen or adding more. It was hypothesized that of the two methods (aerating and fermenting), aerating would produce the greatest volume of carbon dioxide.

Methods/Materials
This investigation used dry active baking yeast, sugar, and warm water. The volume of carbon dioxide produced was measured using a graduated cylinder to determine the volume of water displaced. Twenty trials were conducted for each of the three experimental groups (aerating, fermenting, and control). For each trial, 500 ml of warm water (44 degrees Celsius) was mixed with 40 grams of sugar, and then was added to 10 grams of dry active yeast. Depending on the experimental group, the yeast-sugar solution was either aerated using an aeration pump for 10 minutes, the oxygen burned out of the jar using Sterno, or nothing was done at all. The yeast mixture was placed in the apparatus and allowed to produce carbon dioxide for 30 minutes. Every 15 minutes, the volume of carbon dioxide produced by the yeast was measured.

Results
The results showed that the aeration and fermentation experimental groups averaged close to the same volume of carbon dioxide produced (aeration - 522 mL and fermentation - 544 mL). Whereas, the control experimental group's average volume of carbon dioxide produced was less (411 mL).

Conclusions/Discussion
The results produced by the fermentation experimental group were unexpected and did not support the hypothesis of this investigation. The results of this investigation could be important to help bakers and brewers all over the country produce better products.

Summary Statement
Yeast-sugar solutions were tested, by either aerating or burning off the oxygen during the trials, to determine whether the increase in oxygen would cause yeast to produce a greater volume of carbon dioxide.

Help Received
Parents helped get equipment and supplies.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kayleen D. Ports

Project Number
J1425

Project Title
Spoon Fed Germs: Does Baby Food Live Up to Terms?

Abstract

Objectives/Goals
Unlike adults, babys immune systems are unable to fight off harmful bacteria. The mouth is the most common way bacteria enters their immune system. I was wondering if baby food would become unusable if left out on the counter, and if so, how long would it take for the food to go bad. I wanted to know this because I see parents reuse baby food all the time; sometimes they put it in the refrigerator and sometimes they dont depending on whats convenient. I hypothesized that refrigeration would decrease the bacteria on the baby food and that the beef type would have the most growth. I also thought that as the time increased so would the amount of bacteria.

Methods/Materials
I tested this problem by taking 4 types of baby food, beef, fruit, vegetable, and juice that had been left out over a period of time (5 different intervals). Half my tests were refrigerated and half were left on the counter in room temperature. I then inoculated a small sample of baby food onto a blood agar plate and incubated the plates for 48 hours at 38 degrees Celsius. Then I counted the bacteria spores for my results. To control my experiment I worked under a lab hood, wore latex gloves, and used the same brand of baby food for each test. In this experiment the independent variables are the types of baby food, the amount of time left out, and whether it was refrigerated. The dependent variable is the amount of bacteria growth.

Results
After analyzing my data I concluded that it is not safe to leave baby food out. As the time it sat out increased, so did the amount of bacteria found in it, refrigeration only slightly decreased bacteria growth, and the food containing meat had the most bacteria.

Summary Statement
My project examines the levels of harmful bacteria that grow in baby food after it has been opened and used in both refrigerated and room temperature environments over a period of time spanning 0 to 14400 minutes.

Help Received
Mrs. Marcarelli supervised during testing; Parents helped financially; Anna Lubati provided agar plates and sterile loops; Mr. Miller properly disposed of the used agar plates.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Naveen Qureshi

Project Number
J1426

Project Title
Doc, Is It Time to Throw That Tie Away?

Abstract

Objectives/Goals
The objectives of this project were to determine whether doctors' ties are actually clean and how much bacteria grow on them. There have been many studies done that show that bacteria can easily be spread from patient to patient in a hospital. One of the ways in which bacteria are spread is through the contact of doctors with their patients. A common way of bacterial transfer from doctors to patients is through contact of the patient with a doctor's clothing. Ties were chosen because they may easily come into contact with a patient.

Methods/Materials
The materials used were10 doctors wearing ties, sterile cotton swabs moistened with distilled water, nutrient agar plates, an incubator(23.89 degrees Celsius), two people who wear ties but do not work around sick people.

The method used was to first swab a small area on each doctor's tie in the morning before he began seeing patients. These samples were then plated onto nutrient agar plates and incubated for twenty-four hours. The ties of these same doctors were swabbed again at the end of the day when the doctors had finished seeing patients. These samples were plated and incubated and the resulting bacterial growth counted twenty-four hours later. The same steps were followed for the control group.

Results
Three trials were conducted for each of the subjects in the experimental and control groups. The results for each trial were fairly consistent. The results showed that on average, the doctors' ties carried much higher amounts of bacteria at the end of the day than they did at the beginning of the day. There was an average growth of 35 colonies in the morning as compared to an average of 273 colonies at the end of the day.
The control group had very different results. There was an average of only 0.17 bacterial colonies grown on these ties in the morning and an average of 6 bacterial colonies in the evening.

Conclusions/Discussion
The results of this study show that working in an environment where there are ill people present does make a difference in the levels of bacteria found on a person. The results show that there are,on average, much higher amounts of bacteria found on doctors' ties than on ties of people who do not work around sick people. The results also show that doctors' ties have significantly higher levels of bacterial growth on them at the end of the day than they do at the beginning of the day, which confirms my hypothesis.

Summary Statement
This study addressed the question of whether or not working around sick people effects the amount of bacteria present on that person.

Help Received
Mom bought materials and helped with project; Dad and his fellow colleagues let me test their ties; uncle (lawyer) & grandfather (professor) were the control group; Hemet Hospital Lab allowed me to use incubator; my brother Zaid helped with the photos; Mr. Post gave me insight and helpful advice

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jesse J. Rothbard

Project Number
J1427

Project Title
Antibiotic Resistant Bacteria on Chickens: Are Organic and Nonorganic Store Bought Birds Equally Infected?

Abstract

Objectives/Goals
The goals of these studies were
1.to determine whether antibiotic resistant bacteria could be isolated from store bought chicken breasts,
2.to determine whether organic products had less antibiotic resistant bacteria than nonorganic chickens

Methods/Materials
Two different types of organic and nonorganic chicken were swabbed, the resultant bacteria were incubated overnight and streaked on agar plates, with and without five different antibiotics to determine whether any organisms in the population were antibiotic resistant.

Results
1. No bacteria grew on the control plates, where samples from the chicken were not applied to the agar, but because all other variable were held constant, I can conclude all bacteria arose from the surface of the chickens.
2. Antibiotic resistant bacteria were isolated from the surface of each chicken.
3. The organic chicken samples had a smaller range of antibiotic resistant strains and fewer colonies than samples from nonorganic chickens.
4. Bacteria resistant to ampicillin, kanamycin, streptomycin, and tetracycline were observed. No bacterium isolated was resistant to chloramphenicol.

Conclusions/Discussion
I could conclude that all bacteria observed on the plates arose from the bacteria because nothing grew on the control plates. More antibiotic resistant bacteria was isolated from nonorganic chicken than the organic saples, and they were resistant to a wider range of antibiotics. Even though I do not know which, if any, antibiotics were given to the chickens used in this study, ampicillin, kanamycin, streptomycin, and tetracycline are routinely included in chicken feed. In my limited research, I could not find any example of chloramphenicol being included in chicken feed. In this study, bacteria were found resistant to all antibiotics with the exception of chloramphenicol. A interesting correlation.

Summary Statement
I found that there were more antibiotic resistant bacteria on the surface of store bought organic than nonorganic chickens and the resistance were to antibiotics routinely added to chickenfeed.

Help Received
My father was able to provide me all the reagents used in this experiment. The LB broth, the agar, the antibiotics, and the sterile swabs. In addition, I used an autoclave and 37oC incubator that were in his laboratory.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Marissa A. Salinas

Project Number
J1428

Project Title
A Comparison of Bacterial Numbers and Types in Homo sapiens and Cinis familiaris

Abstract

Objectives/Goals
My objective is to see if dogs have cleaner mouths than humans. My gaol will be trying to prove that dogs have cleaner mouths than humans.

Methods/Materials
Pent Glass Rod # Blood Agar Base
Alcohol Burner # Blood Agar Plates # 48
Cotton swabs # 12 # 50mL of Blood
Incubator # Test tubes # 4
Distilled Water - 480 mL # Alcohol Methyl - 99.8%
6 Human Subjects # 6 Dogs
Finger Bowl # Petri Dish Base
Alcohol Methyl 99.8 # Clorox Bleach
Blood Agar Base # Pipette
Nutrient Agar plates # 48

Results
The high in my experiment to see who had the most bacteria on nutrient agar was human 2 with an average of 73.25 and the low in my experiment was human 1 at 4.5. The high in my experiment to see who had the most bacteria on the Blood agar plates was dog 6 at 52.0 and the low was dog 2 and dog 3 at 16.75. The high in my experiment to see who had the most pathogens was human 2 at 25.66 and the low was dog 3 at 8.37. The high in all my averages on nutrient agar plates was dogs at 35.25and the low was humans at 28.79. The high in all my averages on Blood agar plates was humans at 28.83 and the low in was dogs 27.08. The high in all my averages for Alpha and Beta Hemolysis was humans at 17.82 and the low was 14.32.

Conclusions/Discussion
After concluding my investigation to see if dogs have cleaner mouths than humans I found that my hypothesis, that dogs would have cleaner mouth than humans was incorrect. My results were inconclusive. Reason being statistics have shown no real difference between the two groups, humans and dogs were equivalent.

Summary Statement
I am testing to see if dog have cleaner mouths than humans.

Help Received
Mother helped glue; used lab equipment at Sanger High School lab room 110 under the supervision of Mr. Nathan Whittington.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Andrew T. Schilling

Project Number
J1429

Project Title
The Effect of pH on the Bacterium E. coli

Abstract

Objectives/Goals
Many cookbooks and recipes state that adding acids such as vinegar to foods will stop harmful bacterial growth. I decided to test this idea by determining the ability of the bacterium E. coli to grow in media buffered to pH levels between 4 and 8. My hypothesis is that the bacteria will grow better at neutral pH than at acidic pH.

Methods/Materials
Five 50 ml samples of LB broth were buffered with acetic acid at pH 4 and 5, with MES at pH 6 and with HEPES at pH 7 and 8. Each sample of medium was transferred to a 250 ml flask and 0.5 ml of a saturated overnight ulture of E. coli was added to each flask. A sample was taken from each flask at times 0, 0.5, 1, 2, 3, and 4 hours. The amount of bacteria in each sample was measured using a spectrophotometer at 595 nm. The OD(595) and time data were plotted to show growth curves at each pH tested.

Results
My first experiment showed that the bacteria grew at identical rates at pH 6, 7 and 8 and did not grow at pH 4 and 5. Since I used a different buffer at pH 4 and 5 I was concerned that the failure to grow at these pH levels was due to a contaminant in the buffer. I repeated the experiment with a differnet lot of acetic acid to test this idea. My second experioment gave the saame result as the first: no growth at pH 4 and 5 and equal growth at pH 6, 7 and 8.

Conclusions/Discussion
I conclude that E. coli bacteria grow best at a near neutral pH of 6-8. They do not grow at a more acidic pH of 4 or 5. The advice to add acids to food appears to be a valid way to prevent the growth of E. coli. My experiments used a single non-pathogenic strain of E. coli and should be repeated with pathogenic strains of E. coli and other bacteia species to reach a more general conclusion on the value of low pH for preventing food contamination. It is possible that acetic acid is toxic to E. coli and therefore my experiments should be repeated using a different buffer at pH 4 and 5.

Summary Statement
I tested the ability of E. coli bacteria to grow at different pH levels and concluded that the bacteria grow well at neutral pH (6-8) and poorly at acidic pH (4-5).

Help Received
I performed all the experimental procedures myself. My father supervised me to ensure safety. The experiments were performed in my father's laboratory at Stanford University.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Zak Schutzer

Project Number
J1430

Project Title
Sun Is to Algae as Kryptonite Is to Superman?

Abstract

Objectives/Goals
This study tested whether or not a higher percentage of sunshine and more photosynthetically active radiation have an effect on the amount of chlorophyll produced by algae in the ocean.

Methods/Materials
The data had already been recorded, all that had to be done was the grueling work of entering it into an Excel file using home made computer programs. Once entered into Excel, the two different data sets were compared and graphed.

Results
No correlations were found in comparing the data sets. A statistical analysis was run on the results. The correlation coefficient for the percentage of sunshine data and the chlorophyll data was found to be .021003, showing no correlation.

Conclusions/Discussion
In conclusion to the study no correlations were found between the sun data and the chlorophyll data. The chlorophyll data had a few high outliers and then flat lined. None of the outliers could be explained by the sun data. Both sun data results, (photosynthetic active radiation and percent of sunshine) showed an almost identical graphing result. They both have a cyclic pattern most likely corresponding with the seasons.

The results disprove the hypothesis. The graphs suggest that the sun data tested has little to no effect on the amount of chlorophyll. The correlation coefficient of the chlorophyll data and the photosynthetically active radiation was .021003. The correlation coefficient of the chlorophyll data and the photosynthitcally active radiation was .020988.

Summary Statement
My project deals with the correlation between the reproduction of alga and the sun's rays.

Help Received
My father helped guide me to make the computer programs I used in processing the data sets. Dr. Joel Norris obtained the large sun data set I used from the Scripps Pier.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Saqib Shahabuddin

Project Number
J1431

Project Title
Danger! Beware of Mold

Abstract

Objectives/Goals

My experiment was to figure out if different types of wood resist mold growth. My hypothesis was white wood will resist the growth of mold the best. For my procedure I soak the wood samples (redwood, pine wood, and white wood) in water, and placed them in sealed plastic boxes for two weeks. The red wood grew the least amount of mold while the pine wood grew the most mold. My project is important to people because a lot of common items we are near everyday such as boats, tables, chairs, and homes are made of wood. We want to use the right type of wood so that these items will prevent the growth of mold as long as possible. Another point is that most of the time in our lives, we are indoors. We spend most of our time in houses, schools, and offices, all of which are made out of wood. Mold can grow in any of these areas undetected. Mold is unhealthful and can make us ill.

Methods/Materials

Procedure: 1.Buy five pieces of wood, 3 by 4½ in of redwood, Pine wood, and white wood. 2.Mark each sample of wood with numbers (1-5). 3.Soak samples of red-wood, white-wood and pine-wood and place them in a plastic box labeled #Redwood#, "Whitewood", & "Pinewood". 5.Place the boxes in a warm area for twenty-one days to allow mold to grow. 6.Measure the growth of the mold every other day in inches.

Results

Record Date Redwood Samples; Mold growth in inches
Date SAMPLE 1 SAMPLE 2 SAMPLE 3 SAMPLE 4 SAMPLE 5
1/9/07 0.25 0.13 0.06 0.06 0.06
1/11/07 0.32 0.13 0.13 0.25 0.13
1/13/08 0.32 0.19 0.13 0.25 0.19
1/15/08 0.32 0.25 0.19 0.50 0.19
1/17/08 0.38 0.25 0.25 0.50 0.25
1/19/08 0.38 0.25 0.25 0.56 0.31
1/21/08 0.38 0.31 0.31 0.56 0.50
Similar sample results for White wood and pine wood is in the report

Conclusions/Discussion

My project is important to people because a lot of common items we are near everyday such as boats, tables, chairs, homes are made of wood. We want to use the right type of wood so that these items will prevent the growth of mold as long as possible. Another point is that most of the time in our lives, we are

Summary Statement

Which type of wood is more susceptible to wood, since it can grow undetected and harmful to our health?

Help Received

From Sister in taking pictures

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Avneesh K. Sharma

Project Number
J1432

Project Title
Do Serving Dishes in Restaurants Carry Bacteria?

Abstract

Objectives/Goals
To determine whether dishes on which food is served in restaurants carry bacteria which can cause disease.

Methods/Materials
Empty serving dishes from five restaurants were swabbed when they were first brought to the table and re-swabbed after cleaning with an alcohol wipe. The re-swabbed dishes cleaned with the alcohol wipe served as the control group. All the swabs were plated on separate Petri dishes containing agar and placed in an incubator at 37 degrees Celsius. The Petri dishes were examined for bacterial growth after 24 hours. Subcultures were then set up and incubated for 24 hours at 37 degrees Celsius. The Petri dishes were re-examined for bacterial growth after 48 hours. Bacteria were identified by using Gram Stain, catalase test, latex coagulation test and indole test.

Results
Of the five restaurants tested, dishes from one restaurant did not grow any bacteria; dishes from two restaurants grew one type of bacteria; dishes from one restaurant grew two types of bacteria; and dishes from one restaurant grew five types of bacteria. No bacterial growth was found on the control group of dishes.

Conclusions/Discussion
Many people get sick after eating in restaurants. The Center for Disease Control estimates that millions of cases of food poisoning occur in the U.S. every year. The Department of Environmental Health tests food hygiene in restaurants, but does not test the cleanliness of dishes in which food is served to customers. This study shows that serving dishes in some restaurants carry pathogenic bacteria.

Summary Statement
The project is to determine whether serving dishes in restaurants carry pathogenic bacteria.

Help Received
Father helped collect samples from restaurants; project guide was Dr. Stephan Gregorian; lab work done with help from Samuel Jiminez in Placentia Linda Hospital; supervisor was Betty Robinson (Microbiologist); mother helped with display board.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Vincent L. Shields

Project Number
J1433

Project Title
Five Second Rule: Fact or Fiction?

Abstract

Objectives/Goals
How much time does it take to transfer bacteria from a contaminated wood surface onto clean food? I predicted that bacteria are capable of transferring from a contaminated surface onto clean food in less that 5 seconds to disprove the "5 second rule", a commonly held belief that dropped food remains free of contamination if quickly recovered.

Methods/Materials
I established the percent of bacteria that can be transferred from a contaminated wood surface onto clean Hershey Chocolate Kisses during selected time points of exposure. Raw chicken was rubbed onto a clean wood board evenly to contaminate the surface. Hershey Chocolate Kisses were placed on the contaminated board for time intervals of 5, 10, 20, 40, and 80 seconds. The contaminated Kisses were directly inoculated onto the blood agar culture plates. The inoculated plates were incubated for 48 hours at 37^0 C. Random areas of the contaminated board were also cultured to establish the source level of bacteria and negative controls were used to verify that the Kisses were free of bacteria when unwrapped from the foil. The experiment was repeated 4 times at each selected exposure interval. The numbers of bacterial colonies per cm^2 were averaged.

Results
I calculated the percent of bacterial colonies transferred from the contaminated wood surace onto the Kisses. The percent of bacterial colonies transferred for 5, 10, 20, 40, and 80 seconds is 1.22, 1.38, 3.04, 4.78, and 14.26% respectively.

Conclusions/Discussion
The findings confirm that bacteria can be transferred from a contaminated surface onto clean food within 5 seconds. Longer periods of exposure resulted in an increase in the transfer rate of the bacteria to the Kisses. To conclude, the "5 second rule" is just an urban legend.

Summary Statement
The purpose of my project was to establish how much time does it take to transfer bacteria from a contaminated wood surface onto clean food, Hershey Chocolate Kisses.

Help Received
Science teacher gave me direction and encouragement. Parents supported my learning of bacterial culture techniques, which I performed independently.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

Madylynn Kate Snyder

Project Number

J1434

Project Title

The Search For Grandma Frieda's Bigger Better Buns and Beyond... Naturally!

Abstract

Objectives/Goals

In this project wild natural yeast was added to bread dough. The purpose of the project was to test whether bread dough with wild natural yeast would rise higher than bread dough that used commercial yeast.

Methods/Materials

A mixture of flour and water was placed in a calibrated beaker. The beaker was covered with a thin mesh fabric and placed outdoors near plants for five days. Each day, one half of the flour and water mixture was taken out and fed with replacement of equal portions of flour and water in the same amount. The purpose of replacing the mixture with new flour and water mixture was to feed the yeast that had already been captured thus creating more yeast cells. The mixture was brought indoors to ferment for 12 hours before it was mixed with Grandma Frieda's bread dough recipe.

Results

It was found that natural wild yeast with bread dough produced 13ml more than enduring bread dough with commercial yeast.

Conclusions/Discussion

Certain temperatures and weather conditions affect the strength and amount of yeast captured. Yeast is most prevalent during warmer windier conditions. In conclusion bread dough with natural wild yeast rises higher than bread dough with commercial yeast.

Summary Statement

The purpose of the project was to test whether bread dough with natural wild yeast would rise higher than bread dough with commercial yeast.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Shimona Srivastava

Project Number
J1435

Project Title
Microwave Radiation's Effect on the Growth of Bacteria

Abstract

Objectives/Goals
Measure the impact of microwave radiation on the growth of bacteria

Methods/Materials
I made an incubator out of a lamp and a box. Then I put the milk into the incubator for four days. After this, I placed the milk into the microwave for various lengths of time: 5, 10, 15, 20, 40 and 120 seconds. Then, I took a q-tip and dipped it into the milk and smeared the sample onto the agar. After that I put the many samples into the incubator. I observed the agar with the bacteria and compared the growth of bacteria.

Results
If the heat levels are not high enough in a microwave, then it will prompt bacterial reproduction.

Conclusions/Discussion
A microwave is generally safe to warm food in as long as heat level becomes high enough.

Summary Statement
This experiment was done to measure the effect of microwave radiation on bacterial growth.

Help Received
Brother helped prepare the board; Dad helped fill the application; Mom helped get all the materials.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Gavin Y. Tse

Project Number
J1436

Project Title
Wry E. Coli

Abstract

Objectives/Goals
The objective is to determine whether E. Coli is magnetic like other magnetotactic bacteria. The hypothesis is that E. Coli is magnetic and that the bacteria concentration will increase as the distance toward the magnet decreases.

Methods/Materials
E. Coli was placed in a clear plastic container filled with normal saline solution. A magnet was placed adjacent to the container. Using a dropper, samples of the bacteria in normal saline solution were taken at distances of 0 mm, 3 mm, 6 mm, 9 mm, and 12 mm and placed on slides. The slides were then dried and stained before being examined under a microscope. This process was repeated five times. The slides were analyzed with a semi-quantitative system of ratings from one to ten (one being the least concentration of bacteria and ten being the most).

Results
As the bacteria were analyzed, the ratings were as follows: 0 mm was 6.67, 3 mm was 5.50, 6 mm was 4.83, 9 mm was 4.33, and 12 mm was 4.00. The bacteria concentration increased as the distance from the magnet decreased.

Conclusions/Discussion
The hypothesis supported the results. In the future, since E. Coli is magnetic, doctors could possibly localize E. Coli to a certain part of the body then apply treatment to only that part. If other harmful bacteria are also magnetic, doctors could do this to prevent other harmful diseases too.

Summary Statement
This project tests the effect of Magnetism on E. Coli.

Help Received
Dr. W. Chick lent me a powerful microscope and reviewed my report; Uncle Jack answered questions on magnets; Dr. E.Tse gave me an overall idea for the project.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alexandra L. Venable

Project Number
J1437

Project Title
Equine White Line Disease

Abstract

Objectives/Goals
My goal was to grow White Line Disease, see what conditions it grows in, and test which remedy works.

Methods/Materials
Petri Dish, Thrush Buster, Thrush Remedy, Formaldehyde Iodine, Sabouraud agar, Non-Nutrient agar, Nutrient agar, Loop, Horses, Hoof pick, Light/Dark (cover), Two cookie trays, Used Motor Oil.

Results
Nutrient agars were the first to grow. The Non-Nutrient agar grew nothing initially. Sabouraud agar had microbes growing later. Day two the Nutrient agars in the dark had White Line Disease growth. I took a sample and swiped Nutrient agar plates which grew quickly. The fungus grew on moist Nutrient agars in the dark. I used three different remedies on White Line Disease growth. Thrush Remedy did nothing, Thrush Buster killed a little and the Formaldehyde/Iodine did not do anything unless a lot was used directly on the fungus. Thrush buster worked best. Formaldehyde/Iodine worked well on direct application only.
The fungus grew over the Thrush Remedy and the Formaldehyde/Iodine test spots.
My tests showed the Formaldehyde/Iodine killed White Line Disease only where it covered the fungus. The Thrush Buster killed White Line Disease and it spread out over time and continued to kill more fungus. Thrush Buster continued to be the best remedy and the Thrush Remedy was the worse.
I did more tests using Used Motor Oil, Thrush Buster and Formaldehyde/Iodine. With the small amounts I used the Formaldehyde/Iodine seemed to not kill anything. The effect of the Used Motor Oil was hard to determine. The Thrush Buster killed the fungus and spread out to kill the most White Line Disease.

Conclusions/Discussion
The first part of my hypothesis was successful. I was able to get a sample of White Line Disease from the horse#s hoof and grow it on an agar.
The second part of my hypothesis,that Formaldehyde/Iodine would treat White Line Disease best, was incorrect. The Thrush Buster killed White Line disease where it was applied and continued to spread and kill more fungus over time. The Formaldehyde/Iodine killed White Line Disease only where it was applied directly. Thrush Remedy did not seem to affect the Fungus. The fungus has not grown back over the Thrush Buster as it did the other remedies. The Thrush Buster was the best treatment for White Line Disease.
A source of error in my project was obtaining a sample of White Line Disease from a hoof with a large infection.

Summary Statement
My project is about growing and treating equine White Line Disease.

Help Received
Mother helped collect samples and edit report; farriers gave demonstrations and shared knowledge

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jonathan J. Woolley

Project Number
J1438

Project Title
The Effects of Light, Temperature, and Volume on Yeast Enzyme Activity

Abstract

Objectives/Goals
The goal of my experiment was to find out which variable of different types of light, temperatures, and starting volume affected the amount of yeast enzyme activity.

Methods/Materials
For the experiment i used one microwave oven, one spoon, one sharpie, twelve clear plastic cups, 810ml of apple juice, twenty-seven tsp. of yeast, one lamp, ice, one regular light bulb, and one UV light bulb. To do the experiment i labeled nine cups one through nine and then put 15ml of apple juice in cups one, four and seven, 30ml in cups two, five, and eight, and then 45ml in the other three cups. After that i put ice in the remaining cups and put those cups under cups one, two, and three. Then i put cups seven through nine in the microwave for twenty seconds each, after that i put one tsp. of yeast in each cup and put that under a lamp with a regular light bulb. After twenty minutes i recorded my observations and rinsed out all the cups and put the apple juice in them and heated them up again etc. and then i put it under the UV light, and then repeated under no light at all.

Results
The results i found were that the temperature affected the activity the most with the hotter the temperature, the more activity. I also found that the starting volume and the different types of light did not affect the enzyme activity very much.

Conclusions/Discussion
To conclude, i realized that if i wanted to create more enzyme activity, then i would heat it up, and that it would not matter very much at all if i had a certain type of light or volume

Summary Statement
My project is about how much yeast enzyme activity is produced by three different variables.

Help Received
father helped me learn regression analysis

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Philip C. Wright

Project Number
J1439

Project Title
Cleaner Kitchen and Bath with UV Light

Abstract

Objectives/Goals
The goal of my project was to determine the effectiveness of ultraviolet and infrared radiation in killing common bacteria.

Methods/Materials
Petri plates with nutrient agar
Pure cultures of Escherichia coli, Pseudomonas aeruginosa and Serratia marcescens,
UV light, IR light, Cotton swabs, UV shield, stop watch.

Petri plates with nutrient agar were seeded with the different bacteria by dipping a cotton swab into the pure culture tube and then swabbing the entire surface of the Petri plate with the bacteria.
For the initial UV light exposure experiments the seeded Petri plates were put under the UV lamp with open lids. For the timed exposure plates half of each plate was covered with glass so that only half of the plate would be exposed to the UV radiation and the other half of the plate would serve as an unexposed control section on the same plate. After the UV exposure the lids were replaced and the plates kept at room temperature for several days to observe growth.
For infrared exposure the seeded Petri plates were put under the IR lamp with open lids.
After the IR exposure for different length of time in each experiment the plates were removed from the IR light source, the lids replaced and the plates kept at room temperature for several days to observe growth.
Effectiveness of the treatment was calculated as a percentage and was determined by relative comparison of bacteria growth on exposed versus unexposed sections of the plates.

Results
The initial experiments determined that one minute of UV light was more than enough to kill all tested bacteria. On the other hand, one minute of IR exposure was not nearly enough to kill the bacteria.
Further experiments determined that ten seconds of UV light exposure is enough to kill over 95% of common bacteria and 20 seconds exposure killed all bacteria. IR light also kills bacteria but it takes much longer and is far less effective than UV light.

Conclusions/Discussion
UV light is a highly effective way of killing common bacteria.
UV lights could be used in kitchen and bathrooms of homes and public places to keep those places cleaner and free of dangerous bacteria.

Summary Statement
My project tests the effectiveness of UV and IR radiation in killing common bacteria and suggests applications for the use of UV radiation to control bacteria growth in common places.

Help Received
My mom helped getting the materials for my project, including the Petri plates, UV and IR lamps and pure cultures of the bacteria. She also supervised my use of the UV and IR lamps during the experiments.